China's Evolving Nuclear Deterrent

Major Drivers and Issues for the United States

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RAND CORPORATION

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Library of Congress Cataloging-in-Publication Data is available for this publication.
ISBN: 978-0-8330-9646-3

Published by the RAND Corporation, Santa Monica, Calif.

Cover: REUTERS/Andy Wong/Pool.

Preface

Since its first nuclear test in October 1964, China has maintained a modest nuclear force to achieve limited deterrence goals. In many ways, China's limited nuclear arsenal and restrained posture have made it an outlier in the nuclear world. In recent years, however, new trends have turned China's outlier status on its head; while the established nuclear states, especially the United States and Russia, have reduced their nuclear inventories, China has increased the numbers of its strategic missiles and warheads and dramatically improved the quality of its force. Understanding the future of China's nuclear forces, doctrine, and policy is critical to shaping an appropriate U.S. approach to strategic issues.

This report examines the key drivers, including both external and internal forces, that will shape Chinese nuclear decisionmaking over the next ten years. While it pays particular attention to China's strategic relationship with the United States, which remains Beijing's primary focus in formulating policy, it also considers the role that developments in third countries might play—a topic other studies have seldom treated and never systematically. In this context, China's emergent nuclear relationship with India and dynamics on the South Asian subcontinent are likely to be particularly important. The analysis of internal drivers addresses the potential impacts of bureaucratic politics, organizational processes, and the availability of resources. This research should be of interest to nuclear specialists, Asian foreign policy and security experts, policymakers, military officers, and anyone interested in Chinese or nuclear issues.

The work was conducted within the Strategy and Doctrine Program of RAND Project AIR FORCE. The draft report was reviewed by formal peer reviewers and U.S. Air Force subject-matter experts.

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and Strategy and Doctrine. The research reported here was prepared under contract FA7014-06-C-0001.

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Summary

China's People's Liberation Army (PLA) is expanding and improving its nuclear inventory, and a range of international and domestic drivers is likely to accelerate that trend over the coming decade. To be sure, important elements of continuity will almost certainly persist. China's general approach to nuclear policy has been remarkably consistent since its first nuclear test in 1964. Over the years, Chinese military publications, official statements, and defense white papers have highlighted the key elements of China's nuclear policy, including no-first-use of nuclear weapons and an emphasis on maintaining a limited number of nuclear weapons—what China calls a "lean and effective" [*jinggan youxiao*] deterrent capability—to deter nuclear attack. Although Beijing is unlikely to abandon these formal elements of policy, China appears to be increasing emphasis on nuclear deterrence, and a number of important drivers may lead to shifts in the way policies are interpreted and operationalized. China appears to be moving away from an approach to deterrence that deems the ability to impose some risk of a second strike sufficient. It is moving toward a more calculated strategy of assured retaliation.

Before turning to the external and internal drivers that may be shaping this evolution, it is worth noting that improved capabilities already give China new strategic options. Chinese nuclear forces have undergone a significant transformation over the past 30 years, characterized by a shift from primary reliance on intermediate- and medium-range missiles to a force of intercontinental and medium-range nuclear systems. The pace of change has increased over the past decade, with the maturation of new technologies and the growth of the Chinese defense budget. With the recent addition of road-mobile intercontinental ballistic missiles (ICBMs), improved nuclear-powered ballistic-missile submarines, and multiple independently targetable reentry vehicles (MIRVs)–capable silo-based ICBMs, as well as the ongoing development of hypersonic-glide vehicles and MIRV-capable mobile ICBMs, China is fielding a more capable nuclear deterrent force.

External drivers are likely to affect the future development of this force and how China operationalizes its nuclear policy. Chinese strategists adopt a dualistic view of the current external security environment. China views its future as inextricably linked to the international community and perceives that the international security environ-

ment is generally peaceful and stable. But Chinese strategists highlight a range of increasingly severe threats to China. The United States is the central driver of China's nuclear calculus. Beijing has welcomed some recent adjustments to U.S. policy, such as the commitment made in the 2010 Nuclear Posture Review to deemphasize nuclear weapons. But Chinese strategists remain deeply concerned that developments in U.S. intelligence, surveillance, and reconnaissance; conventional prompt global strike; and ballistic missile defense may jeopardize China's retaliatory capability. In large part because of this, Chinese strategists suggest the PLA will continue to pursue a portfolio of qualitative and quantitative enhancements to its nuclear inventory.

While China continues to focus primarily on the United States, other regional nuclear states are becoming more prominent in PLA thinking. The development of Indian nuclear forces has recently garnered increased attention from Chinese strategists, who previously discounted Indian military potential. Although China has long accepted nuclear asymmetry vis-à-vis the United States and Russia, Chinese interlocutors acknowledge that, for cultural and historical reasons, Beijing might be unwilling to accept Indian nuclear parity with China. More generally, multilateral dynamics associated with nested regional security dilemmas can affect China's security interests. For example, U.S. and Japanese concerns about North Korea's nuclear programs will continue to drive missile defense developments that Chinese analysts fear could undermine the credibility of China's deterrent capability. Chinese strategists do not view Russia as an immediate potential threat. But they do see it as shaping larger global nuclear trends and are concerned by the expanded role that nuclear weapons playing in Russian security policy.

Internal drivers are also likely to provide added impetus for the evolution of Chinese nuclear forces and practice. Over the last decade, the PLA Second Artillery Force, PLA Navy, and PLA Air Force increased their influence within the PLA. Second Artillery commanders gained an institutionalized seat on the Central Military Commission, and Second Artillery delegations grew relative to the overall size of PLA representation within important political bodies. During military reforms announced on December 31, 2015, Second Artillery was renamed as the Rocket Force and elevated from a military branch [兵种] to a military service [军中]. Former Second Artillery officers were also appointed to the command and deputy command of the new Strategic Support Force, which gained control of most Chinese military satellites and of cyber and information warfare functions.

Structurally, the lack of firewalls between the conventional and nuclear components of the Rocket Force may have important implications for the future development of China's deterrent. Recent advances in the accuracy and lethality of China's conventional missile technology will, if applied to China's nuclear missile capabilities, introduce previously unavailable policy options for Chinese military strategists. They could, for example, provide the PLA with limited nuclear warfighting options that were unavailable in the past because of the inadequacy of Chinese nuclear force structure.

Resource constraints are not likely to limit China's ability to modernize, though they are likely to limit the pace and scale of growth in numbers. Most economists agree that Chinese economic growth rates will continue to decline in the years ahead, and the military may have to compete with rising social demands on these resources. Barring a more serious crisis in the Chinese economy, however, military budgets are likely to continue rising, if more slowly than they have in the past. And should nuclear weapons be accorded a somewhat higher priority within the military establishment, as the creation of the Rocket Force suggests they might, financial resources would likely be adequate for continued improvement. Most credible public analyses of fissile material stocks suggest the available Chinese stocks of such material are likely limited but nevertheless sufficient for the significant but measured modernization efforts currently under way. However, a full-scale "breakout" designed to create forces rivaling those of the United States or Russia would likely require China to create new reprocessing or enrichment capabilities, which would take years to construct.

Most of the factors examined here suggest that China will pay more, rather than less, attention to nuclear issues in the coming years. Barring significant retrenchments in U.S. strategic programs—and especially in missile defenses—China will continue to plan conservatively against the uncertainties associated with current and future U.S. capabilities. At the same time, the nuclear forces of other states, including some that have only recently begun to register in Beijing, are also likely to loom larger in the near future. Internally, without strong Chinese central leadership intervention to prevent the application of technologies developed for China's conventional missile force to its nuclear forces, such spin-on is likely to occur. Further, even if senior civilian leaders remained committed to the historically limited Chinese view of nuclear requirements (an open question), there is reason to doubt that today's leaders are as involved in detailed oversight as their predecessors, opening the door to heavier influence from scientific and bureaucratic actors.

China's nuclear force modernization could provide PLA leaders options they previously lacked, and these developments would have important implications for the United States. Certain types of changes, including any move toward even limited warfighting ideas, could undermine crisis stability. A broader array of changes, such as more MIRVing of warheads and increasing the pace of missile development, could have implications for arms control efforts more generally, as well as for regional stability. The enhancement of Chinese nuclear capabilities, together with a shifting conventional balance, is likely to affect regional perceptions of Chinese intentions and of the credibility of U.S. commitments, complicating the U.S. task of assuring allies and partners. U.S. military officials should understand that nuclear forces and nuclear deterrence are likely to remain key issues in the Asia-Pacific region and may increase in salience, requiring ongoing attention to declaratory policy, force structure, and military diplomacy. As U.S. leaders take measures to reassure allies and partners, they should engage China on developments most likely to diminish stability, increase escalation risks, or

undermine prospects for arms control. Given the U.S. Air Force's nuclear deterrence responsibilities, senior Air Force leaders will have a leading role in setting this agenda.

Acknowledgments

We are indebted to many individuals for valuable substantive advice and comments and to others for equally indispensable editorial and administrative support. HAF/A10 was instrumental in shaping the scope of the project at its early stages and provided useful guidance on the context from the U.S. military perspective. Several reviewers provided important insights. Eldridge Colby provided useful comments on how we might sharpen key concepts. Jonah Blank likewise offered valuable feedback on regional context and how multilateral dynamics, especially those involving China and South Asian states, might unfold. A number of U.S. and Chinese scholars and strategists associated with the Track 1.5 U.S.-China Strategic Dialogue also spoke with us during the preparation of this report and provided useful insights and information.

As usual, we received steady guidance and strong leadership from Paula Thornhill, who took a personal interest in the work and helped us frame policy-relevant conclusions. Last but not least, a number of RAND colleagues, including Sarah Hauer, Kari Thyne, and Phyllis Gilmore, were instrumental in preparing the document and keeping research, writing, and editing on track. Whatever shortcomings remain are of course the responsibility of the authors alone.

CHAPTER ONE

China's Evolving Nuclear Deterrent: Introduction

How will Chinese nuclear forces evolve through the 2020s, and what factors are most likely to affect their evolution? The development of Chinese nuclear forces has received far less attention than the modernization of People's Liberation Army (PLA) conventional capabilities. This is, in part, because China's nuclear modernization has proceeded more slowly than the modernization of its conventional forces. However, a number of factors suggest that the pace of change in Chinese nuclear forces and thinking is accelerating and could quicken further over the next 15 years. This report examines a broad range of domestic and international drivers that may affect the pace and direction of Chinese nuclear forces and thinking in the coming years.

U.S. strategic capabilities and posture will almost certainly remain the most important single consideration for Chinese planners, but other factors, including some that register only faintly today, are likely to become more important. These factors include security competition with India; nuclear developments in other regional states; and organizational factors, such as the elevation in status of the nuclear forces and the possible transfer of technologies from the conventional missile forces to the nuclear side. Most, though not all, of these factors will encourage China to expand its inventory and diversify its capabilities. Although China is unlikely to abandon adherence to both its no-first-use policy and a "lean and effective" nuclear force structure, it will likely acquire capabilities more relevant to warfighting doctrines and may begin to discuss or interpret its policies and practices in ways that could accommodate using nuclear weapons for a wider range of purposes.

This chapter provides background on Chinese nuclear forces and direction. We briefly review the existing analytical literature on the topic, noting particular areas of strength and weakness and highlighting the gaps that this report seeks to fill. We then comment on the source material employed in preparing the report. Finally, we outline the sequence of chapters and summarize the key findings of the report.

Background

For years, Chinese nuclear weapons have been more of a boutique topic among China and security specialists than a major concern in international relations. Several factors have relegated the study of Chinese nuclear forces to a narrow range of specialists: the relatively low number of Chinese nuclear warheads (probably in the low hundreds); the very large gap in numbers and quality between its forces and those of either the United States or Russia;[1] the uneven and in many respects slow pace of China's nuclear modernization; Beijing's commitment to a more restrained nuclear policy and posture, as reflected in its no-first-use policy and modest sizing criteria; the U.S. conventional advantage; and the absence of heated political competition between Beijing and Washington. More broadly, nuclear weapons have become less salient in U.S. policy decisions since the end of the Cold War, although maintaining and modernizing the aging force have become priorities for U.S. defense planners in recent years. Many of these circumstances are evolving, some quickly, and Chinese nuclear forces and thinking are likely to factor more prominently in U.S. strategy in the years to come.

The United States is not engaged in an active competition for superiority in the nuclear realm and is instead examining ways of reducing the role of nuclear weapons in security policy. The 2010 U.S. Nuclear Posture Review (NPR) report states that the "role of nuclear weapons in U.S. national security and U.S. military strategy has been reduced significantly in recent decades, but further steps can and should be undertaken."[2] Although the 2010 NPR did not include a no-first-use pledge, the United States did declare that it would not employ nuclear weapons against members of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) who were in compliance with their obligations under that treaty. Despite this, U.S. concerns about the state of America's aging nuclear inventory, as well as developments elsewhere, have grown in recent years, prompting the United States to embark on an ambitious effort to modernize its forces. The Congressional Budget Office has estimated the costs of this program, including those associated with modernizing and maintaining forces, at $348 billion between 2015 and 2024.[3]

Both the United States and Russia have made deep cuts to their nuclear inventories since the end of the Cold War. Because these two states held (and continue to hold) a large majority of the world's nuclear weapons, the reductions in their inventories have

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[1] Russia and the United States are each limited to 1,550 operationally deployed strategic nuclear warheads under the New Strategic Arms Reduction Treaty (New START), but each has about 5,000 when nondeployed warheads are included.

[2] U.S. Department of Defense (DoD), *Nuclear Posture Review Report*, Washington, D.C., April 2010, p. 15. One of the eight major sections of that report, "Reducing the Role of U.S. Nuclear Weapons," details some of the specific measures undertaken toward that end.

[3] Michael Bennett, "Projected Costs of U.S. Nuclear Forces, 2015 to 2024," Washington, D.C.: Congressional Budget Office, January 2015.

also reduced the overall size of global nuclear stockpiles. At its peak in 1987, the U.S. stockpile of strategic weapons included 13,600 warheads on 2,000 delivery vehicles (bombers and missiles).[4] The 1991 START limited both the United States and Russia to 6,000 warheads on 1,600 strategic offensive delivery vehicles.[5] Under the 2010 New START, the new limits are 1,550 warheads deployed on no more than 700 deployed missiles and bombers (with another 100 delivery vehicles nondeployed). New START allows both countries to maintain a reserve of nondeployed warheads.[6] Nevertheless, the total U.S. stockpile of roughly 4,500 warheads (including strategic reserves) in 2016 represents an 86-percent reduction from the 31,255 (including reserves) held in 1967.[7] Russian nuclear holdings have been similarly reduced, from a peak of 40,723 warheads (including reserves) in 1986 to some 4,490 (including reserves) by the end of 2016.[8]

Despite this progress, there is reason to be concerned about global nuclear affairs and the rise of what Paul Bracken has termed "the second nuclear age." More nuclear actors, many new, may become engaged in complex multilateral dynamics exacerbated by questionable doctrines.[9] Since 1998, three new states have tested nuclear weapons—India, Pakistan, and North Korea—effectively joining the nuclear club that had previously included only the "permanent five" nations of the United Nations (UN) Security Council (United States, United Kingdom, Russia, France, and China) and Israel, which has never officially declared its nuclear status but is thought to have such weapons.[10] Concerns persist about Iran's future intentions, despite the agreement, reached in

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[4] Amy F. Woolf, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, Washington, D.C.: Congressional Research Service, 2013.

[5] In the case of bombers, the agreement did not count actual warheads deployed. Instead, it used counting rules based on the number of nuclear capable bombers in the inventory.

[6] Also, like the 1991 START before it, New START does not attempt to count actual warheads deployed on bombers, but rather employs counting rules based on the characteristics of nuclear-capable aircraft.

[7] The 1967 figure is from U.S. Department of State, "Transparency in the U.S. Nuclear Weapons Stockpile," fact sheet, Washington, D.C., April 27, 2015. In addition to the total military stockpile, an estimated 2,500 nuclear weapons have been retired and are awaiting dismantlement. Some 20,000 plutonium cores (pits) and 5,000 canned assemblies (secondaries) are also in U.S. storage. The 2016 figure is from Hans M. Kristensen and Robert S. Norris, "Status of World Nuclear Forces," webpage, Washington, D.C.: Federation of American Scientists, May 26, 2016b.

[8] Historical figures for the Soviet Union are from the National Resources Defense Council, "Archive of Nuclear Data: Table of USSR/Russian Nuclear Warheads," Washington, D.C., 2002. For the 2016 figure, see Kristensen and Norris, 2016b.

[9] Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New Power Politics*, New York: St. Martin's Press, 2013.

[10] India's first nuclear test, subsequently labeled Pokhran I, was conducted in 1974, but India did not proceed with weaponization until after its five tests in May 1998, labeled Pokhran II. Pakistan conducted six tests, all in May 1998, and proceeded directly with weaponization. North Korea conducted five nuclear tests—in 2006, 2009, 2013, and two in 2016 (as of September).

July 2015, limiting Iran's ability to produce weapon-grade fissile material for 15 years. Raising broader questions about the coherence and credibility of the NPT regime are North Korea's withdrawal from the treaty in 2003 and the waiver that the 48-member Nuclear Suppliers Group granted India in 2008 (at U.S. urging). That waiver permits India to trade in civilian nuclear goods despite its nuclear test.

Nuclear doctrines vary as much as the motivations behind them, but some states embrace ideas or policies that raise the specter of relatively rapid or easy escalation to the nuclear level. Russian nuclear doctrine has fluctuated since the end of the Cold War. It regularly conducts large-scale nuclear exercises and appears to rely heavily on nuclear weapons to deter conventional attack.[11] Since Russia occupied Crimea in February 2014 and subsequently intervened in the Donbass area of Ukraine, Moscow has demonstrated a hybrid approach to conflict, ultimately backstopped by a willingness to use nuclear weapons should conflict escalate.[12] Moscow has also made nuclear modernization a major military priority.[13] Pakistan is even clearer in employing nuclear threats to deter or potentially deal with a conventional attack, and both India and Pakistan are not only expanding their nuclear inventories but also pursuing nuclear systems that provide them with at least limited nuclear warfighting capabilities.[14]

These changes provide a backdrop that make developments in China's nuclear arsenal and thinking of particular interest to the United States. China is the only permanent member of the UN Security Council that is currently increasing the size of its strategic nuclear arsenal. The deployment of additional multiple independently targetable reentry vehicles (MIRVs) will likely accelerate the growth of China's strategically deliverable warhead inventory. In December 2015, the Second Artillery Force, China's largest nuclear weapons stakeholder, was renamed the Rocket Force and elevated from a military branch [兵种] to a military service [军中]. Just as important as either the nuclear force's size or status are its capabilities and the associated operational concepts. In this regard, the transfer of technology and operating practices from China's conventional missile force to its nuclear force could provide the country with limited

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[11] On the evolution of Russian nuclear thinking, see Nuclear Threat Initiative, "Russia: Nuclear," webpage, 2015, and Stephen J. Blank, ed., *Russian Nuclear Weapons: Past, Present, and Future*, Carlisle, Pa.: Strategic Studies Institute, U.S. Army War College, 2011. See also Zachary Keck, "Russia to Conduct More Nuclear Drills," *The Diplomat*, September 5, 2014; and Ed Adamczyk, "Russia to Revise Military Doctrine, Responding to NATO," United Press International, September 2, 2014.

[12] Eldridge Colby, *The Role of Nuclear Weapons in the U.S.-Russian Relationship*, white paper, Washington, D.C.: Carnegie Endowment for International Peace, February 26, 2016; Stephen J. Blank, "Russia's Hybrid War: Through a Glass Darkly," *Intersection*, April 14, 2016.

[13] Hans M. Kristensen and Robert S. Norris, "Russian Nuclear Forces, 2016," *Bulletin of the Atomic Scientists*, Vol. 72, No. 3, May 3, 2016a.

[14] See Vipin Narang, "Posturing for Peace? Pakistan's Nuclear Postures and South Asian Stability," *International Security*, Vol. 34, No. 3, Winter 2009/2010, and Christopher Clary, "The Future of Pakistan's Nuclear Weapons Program," in Ashley J. Tellis, Abraham M. Denmark, and Travis Tanner, eds., *Strategic Asia 2013–14: Asia in the Second Nuclear Age*, Seattle: National Bureau of Asian Research, 2013.

nuclear warfighting capabilities. This development is made more likely by the extent of overlap between conventional and nuclear personnel, the scientific and organizational infrastructure, and the apparent lack of firewalls between the nuclear and conventional components of the Rocket Force.[15]

Further spurring the development of China's nuclear arsenal is China's location in a region with highly complex security dynamics—one characterized by overlapping or "nested" security dilemmas in which several states are engaged in security competition at both the systemic and regional or subregional levels.[16] China borders or is close to several nuclear weapon states: Russia, India, Pakistan, and North Korea. Other nearby states, such as Japan and South Korea, are capable of quickly producing nuclear weapons, should their policies change. This could occur if the security environment deteriorates or if U.S. extended deterrence is brought into serious question. Given this complex environment, China may not drive the changes that could, nevertheless, affect its own planning. For example, competition between Pakistan and India could drive changes in Indian nuclear forces or posture that could affect Chinese thinking on a range of nuclear questions.

Regardless of the drivers, changes to the size, nature, and doctrine of Chinese nuclear forces will have important implications for U.S. security interests. A significant expansion of China's force structure would make bilateral U.S.-Russian arms control more difficult, even in the event that Washington and Moscow were otherwise willing. The United States or, more likely, Russia may balk at further arsenal reductions without Chinese participation. Of potentially greatest concern would be intensified strategic competition between the United States and China. Arms competition would not take the same form or be at the same scale as the Cold War competition between the United States and Soviet Union. China's primary objective would be to ensure that it could maintain a survivable and deliverable second-strike capability, although many Chinese strategists would also likely see a more robust deterrent as providing greater freedom of action in regional affairs. Improvements to and expansion of China's nuclear forces will complicate U.S. regional extended deterrence, perhaps making it necessary for the United States to modify specific policies lest confidence falter. Nuclear competition need not directly involve the United States to be of concern to Washington. An intensified nuclear security competition between China and one or more of its nuclear-armed neighbors (most likely India or Russia) could push China to consider limited warfighting concepts if those states were pursuing such capabilities.

Changes to Chinese nuclear forces or strategies could also affect crisis stability and the potential for vertical escalation. Not all these would necessarily be negative. For example, if an expanded inventory led to greater confidence in the survivabil-

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15 This point will be addressed in more detail later, in Chapter Four.

16 Christopher P. Twomey, "Asia's Complex Strategic Environment: Nuclear Multipolarity and Other Dangers," *Asia Policy*, Vol. 11, January 2011, pp. 51–78.

ity of China's second-strike capability, it might mitigate the "use them or lose them" pressures Chinese leaders could feel in the event a conflict began to threaten China's nuclear systems or command and control. However, a number of developments could exacerbate risk. If new mobile systems (whether land or submarine based) are difficult to differentiate from conventional systems in the confusion of war, the risk that these systems might be inadvertently struck would increase—with the resulting possibility that critical red lines on China's nuclear use could be accidentally crossed. Higher readiness levels, the mating of nuclear warheads with delivery systems, and the deployment of weapons to operational units could also increase the chances of accidental or mistaken use if wartime pressures and confusion led to uncertainties about central command authority or orders. And finally, Chinese leaders may believe that a strong second-strike capability would greatly diminish the probability of nuclear escalation, leading them to accept greater escalation risk at lower levels of conflict.

There is, of course, nothing inevitable about the potential developments outlined above. As a number of observers have rightly noted, Chinese nuclear policy has remained remarkably consistent over the years, and its forces have, in many ways, grown more slowly than might have been expected, given China's stunning economic growth over the last 30 years.[17] Moreover, some domestic or internal variables could lead to more restraint than our baseline case suggests. U.S.-China engagement on strategic nuclear issues has intensified in recent years, and it is conceivable that this could lead to increased mutual restraint. Alternatively, senior Chinese Communist Party leaders could, if so inclined, exercise strong oversight and "intervene" in PLA technical decisions to address some of these concerns. China's nuclear inventory is already evolving quickly, with the pace of modernization and growth having accelerated over the last 20 years as new resources have become available. Most key drivers examined here are, on balance, likely to stimulate further evolution. But rather than depict any one set of outcomes, our intent here is to explore important variables and their potential effects. To the extent that drivers may push potentially troubling developments—as we think most of the factors examined are likely to do—we will offer suggestions about how to reduce the probability of such outcomes and how to mitigate their impact should they nevertheless occur.

Literature Review

Some aspects of Chinese nuclear forces and thinking have been well covered in the existing literature, but gaps are also apparent. Some basic facts are often disputed, such as the current size of China's nuclear forces and changes in their composition. China

[17] See, for example, Adam P. Liff and Andrew S. Erickson, "Demystifying China's Defence Spending: Less Mysterious in the Aggregate," *China Quarterly*, Vol. 216, December 2013.

provides very limited data on many material aspects of its nuclear forces. Several external organizations have tried to fill the gaps in data and understanding. The *Bulletin of the Atomic Scientists*, for example, publishes an overview of Chinese nuclear forces every year or two, and the Stockholm International Peace Research Institute (SIPRI) includes an analysis and basic data on China's nuclear weapons.[18]

Both these and other nongovernmental sources, however, are dependent on data published by DoD and the U.S. Air Force, and both the format and details provided in these government documents change from year to year.[19] For example, through 2010, the DoD report on Chinese military power included a detailed table of Chinese ballistic missiles and capabilities, but details have not been included since 2011. Somewhat better documented in open-source analyses are Chinese nuclear-related concepts and lexicon, perhaps because this work relies less heavily on government sources for information.[20]

Some of the most thorough and illuminating work has been on the historical development of China's nuclear forces, much of it published by John Lewis and Xue Litai. Exploiting copious Chinese sources, Lewis and Xue provide book-length histories of China's work on atomic weapons (culminating with China's first test of an atomic weapon in 1964), of its development of a submarine-based nuclear capability with the *Xia*-class ballistic missile submarine (SSBN) and its JL-1 submarine-launched ballistic missile (SLBM), and on the evolution of China's nuclear command-and-control system.[21]

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[18] The latest report (as of this writing) on Chinese nuclear forces available from this source is Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2016," *Bulletin of the Atomic Scientists*, Vol. 72, No. 4, June 13, 2016c.

[19] DoD publishes a congressionally mandated annual report on Chinese military power, with information on Chinese nuclear weapons and delivery systems. The latest, as of this writing, is Office of the Secretary of Defense (OSD), *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2016*, Washington, D.C.: U.S. Department of Defense, 2016a. The U.S. Air Force's National Air and Space Intelligence Center (NASIC) also regularly publishes a report on ballistic and cruise missile threats, which includes sections on Chinese developments. See, for example, NASIC, *Ballistic and Cruise Missile Threat*, Wright-Patterson Air Force Base, Ohio, NASIC-1031-0985-13, 2013.

[20] Scholarly works include Fiona S. Cunningham and M. Taylor Fravel, "Assuring Assured Retaliation: China's Nuclear Posture and U.S.-China Strategic Stability," *International Security*, Vol. 40, No. 2, Fall 2015; Alastair Iain Johnston, "China's New 'Old Thinking': The Concept of Limited Deterrence," *International Security*, Vol. 20, No. 3, Winter 1995–1996; Michael S. Chase, "China's Transition to a More Credible Nuclear Deterrent: Implications and Challenges for the United States," *Asia Policy*, Vol. 16, July 2013b; Brad Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century*, Stanford, Calif.: Stanford University Press, 2016; and M. Taylor Fravel and Evan Medeiros, "China's Search for Assured Retaliation: The Evolution of Chinese Nuclear Strategy and Force Structure," *International Security*, Vol. 35, No. 2, Fall 2010. A proliferation of U.S.-China nuclear track 2 dialogues also assist in our understanding of Chinese nuclear policies and doctrine, including the US-China Strategic Nuclear & Space Security Dialogue, run by the Center for Strategic and International Studies, and the U.S.-China Strategic Dialogue, run by the Naval Postgraduate School.

[21] John Wilson Lewis and Xue Litai, *China Builds the Bomb*, Stanford, Calif.: Stanford University Press, 1988, traces the history of China's development of its first nuclear devices; John Wilson Lewis and Xue Litai, *China's*

Many more writers have addressed—with greater variability in analytical quality and sourcing—the evolution of Chinese nuclear thinking and doctrine. These efforts have been primarily devoted to characterizing Chinese concepts of nuclear deterrence and sufficiency and assessing possible changes to Chinese concepts and thinking. During the mid-1990s, Alastair Iain Johnston observed an apparent trend in Chinese thinking, from a "minimum deterrent" strategy toward a limited deterrent one that would include limited warfighting capability.[22] He ultimately concluded that the internal Chinese debate had terminated in favor of maintaining a more limited definition of sufficiency. Nevertheless, disagreement has continued among Western observers about whether Chinese strategists embraced the debate's resolution as permanent or whether Chinese capabilities suggest future nuclear warfighting potential.[23]

Other recent observers have argued that China's nuclear modernization has given it a more robust, medium, or moderate deterrent capability—but does not necessarily suggest a trend toward embracing warfighting capabilities.[24] Taylor Fravel, Evan Medeiros, and Fiona Cunningham suggest that China is pursuing a calculated "assured retaliation" capability. This would be consistent with China's own discussion of nuclear strategy, as well as the recent development of its nuclear forces, but may represent a departure from China's earlier force structure and from a number of prominent historical Chinese statements that appear to assume the existential deterrent value of even small numbers of nuclear weapons.[25]

There are a number of notable gaps or thin areas in the literature on Chinese nuclear forces and thinking. One is the lack of forward-looking assessments that consider future drivers and the overwhelming focus of the literature on recent or contemporary developments. Given the Chinese nuclear community's focus on the U.S. threat since the end of the Cold War, Western sources naturally focus on bilateral U.S.-

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Strategic Seapower: The Politics of Force Modernization in the Nuclear Age, Stanford, Calif.: Stanford University Press, 1993, examines the development of China's *Xia*-class SSBN; and John Wilson Lewis and Xue Litai, *Imagined Enemies*, Stanford, Calif.: Stanford University Press, 2006, looks at command and control issues.

22 Johnston, 1996.

23 Those who have emphasized more limited thinking by Chinese strategists and a higher degree of continuity in nuclear policy and doctrine include Fravel and Medeiros, 2010; Chu Shulong and Rong Yu, "China: Dynamic Minimum Deterrence," in Muthiah Alagappa, ed., *The Long Shadow: Nuclear Weapons and Security in 21st Century Asia*, Stanford, Calif.: Stanford University Press, 2008; Yao Yunzhu, "Chinese Nuclear Policy and the Future of Minimum Deterrence," *Strategic Insights*, Vol. 4, No. 9, September 2005. Those who see goals that stretch beyond minimum deterrence and signs of discontinuity are Mark Schneider, "The Nuclear Doctrine and Forces of the People's Republic of China," *Comparative Strategy*, Vol. 28, No. 3, 2009, pp. 244–270; Larry M. Wortzel, *China's Nuclear Forces: Operations, Training, Doctrine, Command, Control, and Campaign Planning*, Carlisle, Pa.: Strategic Studies Institute, U.S. Army War College, 2007.

24 See, for example, Chase, 2013b.

25 Fravel and Medeiros, 2010; Cunningham and Fravel, 2015.

China nuclear dynamics.[26] Chinese nuclear dynamics with third parties are less well studied, and most of the writing on these topics is incorporated in volumes on China's broader relationships with individual countries.[27] Additionally, unlike assessments of U.S.-Soviet dynamics during the Cold War, there has been little structured assessment of bureaucratic or other domestic drivers of Chinese nuclear programs, despite the materials available on the histories of various Chinese nuclear programs.[28]

Objectives, Scope, and Boundaries

The current report seeks to fill several of the gaps in the literature. It takes a broad look at the internal and external drivers that may be important to the future development of Chinese nuclear force structure, policy, and operational practice. In considering the external environment, we assess not only China's appreciation of the perceived threat U.S. strategic forces pose but also the potential effect of other international actors. Several of these—particularly India but also potentially Russia—are likely to grow in the Chinese consciousness. Similarly, because of the nested and overlapping nature of nuclear security dilemmas, we also consider the nuclear policies of North Korea, Pakistan, and Japan. The report also examines domestic constraints and drivers, including available resources and the competition for them, the "ownership" of nuclear weapons

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[26] Much of this literature focuses specifically on the effect of U.S. missile defense and, more recently, on conventional prompt global strike (CPGS), reflecting the high degree of concern evinced by the Chinese about these programs. Some of this work is primarily technical, with some commentary on implications for China, the United States, and others. See, for example, Dean A. Wilkening, "Airborne Boost-Phase Ballistic Missile Defense," *Science and Global Security*, Vol. 12, 2004. Other work focuses more on Chinese perception of potential U.S. threats. See, for example, Ian E. Rinhart, Steven A. Hildreth, and Susan V. Lawrence, *Ballistic Missile Defense in the Asia-Pacific Region: Cooperation and Opposition*, Washington, D.C.: Congressional Research Service, June 24, 2013; Christopher P. Twomey, "Nuclear Stability at Low Numbers: The Perspective from Beijing," *Nonproliferation Review*, Vol. 20, No. 2, 2013; Gregory Kulacki, *Chinese Concerns About U.S. Missile Defense*, Cambridge, Mass.: Union of Concerned Scientists, July 2014; and Lora Saalman, "Prompt Global Strike: China and the Spear," Honolulu: Asia-Pacific Center for Security Studies, April 2014.

[27] Most of the literature on China's nuclear relations with neighbors focuses on China-India dynamics. See, for example, the collection of essays in Lora Saalman, ed., *The China-India Nuclear Crossroads*, Washington, D.C.: Carnegie Endowment for International Peace, 2012. See also George Perkovich, "The Nuclear and Security Balance," in Francine R. Frankel and Harry Harding, eds., *The India-China Relationship: What the United States Needs to Know*, New York: Cornell University Press, 2004.

[28] A partial exception is Evan S. Medeiros's work on the evolution of thinking within China's nonproliferation community as an example of an "epistemic community" (Evan S. Medeiros, *Reluctant Restraint: The Evolution of China's Nonproliferation Policies and Practices, 1980–2004*, Stanford, Calif.: Stanford University Press, 2007). Examples of assessments of internal Soviet dynamics during the Cold War include Matthew Evangelista, *Innovation and the Arms Race: How the United States and Soviet Union Develop New Military Technology*, Ithaca, N.Y.: Cornell University Press, 1988; Matthew A. Evangelista, "Why the Soviets Buy the Weapons They Do," *World Politics*, Vol. 36, No. 4, 1984; David Holloway, *Technology, Management, and the Soviet Military Establishment*, London: International Institute for Strategic Studies, Adelphi Papers No. 76, 1971; David Holloway, *The Soviet Union and the Arms Race*, New Haven, Conn.: Yale University Press, 1983.

by different branches of the PLA, shifts in the bureaucratic status of nuclear stakeholders, and the potential application of technologies and ideas from China's conventionally armed missile force to its nuclear one.

This assessment of China's potential nuclear future is necessarily speculative. In part, this is simply because of the forward-looking nature of the enterprise and the number and extent of variables in question. In part, however, it is because of the limited source material. We cannot have access to internal Chinese discussions of potential external threats. And even many basic facts about China's nuclear forces and posture are subjects of speculation and debate among scholars and analysts in the United States and elsewhere. Given these uncertainties, the primary purpose of this work is not to make predictions about where we believe Chinese nuclear forces or thinking will be by the end of the 2020s. We do draw general conclusions about where the most important drivers are likely to lead and about potential events that could produce other outcomes. But our primary purpose is to highlight factors that will be important in shaping that future, especially those that may be less well known or appreciated.

In addition to filling a gap in the literature, this report capitalizes on a growing volume of new Chinese source material and interviews with Chinese strategists. Some types of source material are entirely new, while the reissue of substantially revised serial works enables some tracing of evolution in Chinese thinking. The literature includes several different constituent parts: white papers, works on general military science with nuclear components, authoritative edited works specifically on nuclear strategy, books and articles by officers from or affiliated with the Rocket Force, reports from track 1.5 (semiofficial) and track 2 (unofficial) dialogues, and reports from China's state and commercial media. (Note that, except when specifically discussing historical cases, we use the term *Rocket Force* to refer to both the current Rocket Force and the Second Artillery Force that preceded it.) These source types are not all equally important, but each is significant in its own way. The Chinese government has published a biannual white paper on China's national defense since 1998, and these documents include basic descriptions of nuclear policy and the modernization of nuclear forces. These provide the most authoritative, if brief, public statements on policy issues, and their regular appearance over 15 years provides some basis for discussing continuity and change in Chinese official thinking over time.[29]

PLA academic institutions publish edited works related to nuclear strategy and operational art. Some of these, especially those on more-general strategic subjects, have been subsequently revised or entirely rewritten, enabling informed speculation on the evolution in PLA thought (with the understanding that the individual views of head editors or debates within the PLA could also cause change). Such works include *The Science of Military Strategy* (with books published under this title by both the Academy

[29] The 2015 defense white paper, for example, includes several paragraphs on China's nuclear strategy and doctrine. See State Council Information Office, *China's Military Strategy*, Beijing, May 2015.

of Military Sciences and the National Defense University in 1987, 1999, 2001, 2013, and 2015), and *Science of Military Campaigns* (published by the National Defense University under different editors in 2000 and 2006).[30]

Three other edited works are notable. The first is *China's Strategic Missile Force Encyclopedia*, compiled by the Second Artillery Force and published in 2012.[31] The work, which followed publication of similar encyclopedias by the PLA Air Force (PLAAF, 2005) and PLA Navy (PLAN, 1999), runs to 1,190 oversized pages and contains 2,997 entries divided into eight themes, including military thought, military science, political work, logistics, equipment work, technology, history, and military environment for strategic rocket forces. The second is *The Science of Second Artillery Campaigns*, a 2004 publication edited by Major General (later Lieutenant General) Yu Jixun, who subsequently served as deputy commander of the Second Artillery Force.[32] The work, which is marked as classified [机密] under the Chinese system, provides some of the most detailed descriptions of Chinese nuclear operational thinking—as well as some ambiguities in Chinese no-first-use policy.[33] The third is *The Science of Military Service Strategy* (2006), which has a number of sections with unique content on Rocket Force issues.[34]

A relatively new phenomenon—certainly in terms of the quality and quantity of materials available—is the publication of reports and, now, book-length treatments of Chinese nuclear issues by Chinese strategists, including think tanks and university researchers, members of the Rocket Force, individuals affiliated with China's nuclear science and technology community, and arms control officials. Many of the authors are involved in the track 1.5 and track 2 dialogues with U.S. counterparts (discussed below). What these materials lack in terms of official imprimatur (compared with edited works published by military publishers), they make up for by engaging more directly with Western commentary and/or internal Chinese debates. Sun Xiangli, with the Institute for Applied Physics and Computational Mathematics, has written

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30 Those consulted most heavily for this report were 寿晓松 [Shou Xiaosong], 《战略学》 [*Science of Military Strategy 2013*], Beijing: Academy of Military Science Press, 2013; 彭光谦, 姚有志 [Peng Guangqian and Yao Youzhi], eds., 《战略学》 [*The Science of Military Strategy*], Beijing: Academy of Military Science Press, 2001; 张玉良 [Zhang Yuliang], ed., 《战役学》 [*The Science of Campaigns*], 2nd ed., Beijing: National Defense University Press, 2006; 王厚卿 张兴业 [Wang Houqing and Zhang Xingye], eds., 《战役学》 [*The Science of Campaigns*], Beijing: National Defense University Press, 2000.

31 《中国战略导弹部队百科全书》 [*China Strategic Missile Force Encyclopedia*], Beijing: China Encyclopedia Publishing House, 2012.

32 于际训 [Yu Jixun], chief ed., 《第二炮兵战役学》 [*Science of Second Artillery Campaigns*], Beijing: People's Liberation Army Press, 2004.

33 The classification level is best translated as "top secret" [机密].

34 霍小勇 [Hou Xiaoyong], 《军种战略学》 [*The Science of Military Service Strategy*], Beijing: National Defense University Press, 2006.

extensively on nuclear issues.[35] In 2013, Sun published *Strategic Choice in the Nuclear Age: On China's Nuclear Strategy*, on choices open to China and on China's internal debates.[36] Other prominent contributors to this literature include Yao Yunzhu, Li Bin, Fan Jishe, Zhu Feng, and Wu Riqiang.[37]

Track 1.5 (semiofficial) and track 2 dialogues also provide new sources of insight into Chinese thinking on nuclear issues. In recent years, the dialogues have greatly expanded the exchange of views between U.S. and Chinese specialists. Track 1.5 meetings, cosponsored on the U.S. side by the Defense Threat Reduction Agency, have engaged academics, think-tank researchers, military officers, and civilian nuclear specialists. These meetings, held once or twice a year since 2000, have produced written reports and have helped establish relationships between U.S. and Chinese counterparts that have enabled other conferences and edited volumes with contributions from both sides.[38] Articles on Chinese foreign policy and military issues in the Chinese media have proliferated over the past three decades. Articles in the official state media continue to reflect official positions on issues ranging from threat perception to military policy. Commercial media outlets have grown rapidly since the period of reform and opening (initiated in 1978) and play an increasingly important role in shaping Chinese views, in part by reporting on news carried in foreign media sources. Media outlets also provide a venue for strategists, military academics, retired military officers, and other pundits to express their views. Depending on content and the outlet in question, these may be more or less likely to represent official government views or positions.

All this material must be treated in the context of China's actual force modernization and its operational and training activities. Chinese military strategists and academics understand nuclear policy but do not make force structure decisions. Looking forward, we consider the mutual influences of strategy on forces and forces on strategy, as well as the structural conditions and circumstances in China's external and internal environment and how those might shape the evolution of the country's nuclear deterrent.

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35 The institute is a key component of the China Academy of Engineering Physics, which is responsible for China's nuclear weapons research and development.

36 孙向丽 [Sun Xiangli], 《核时代的战略选择: 中国核战略问题研究》 [*Strategic Choice in the Nuclear Age: On China's Nuclear Strategy*], Beijing: China Academy of Engineering Physics Research Center, 2013.

37 See, for example, Yao Yunzhu, "China Will Not Change Its Nuclear Policy," China-U.S. Focus website, April 22, 2013; Yao Yunzhu, "China's Perspective on Nuclear Deterrence," *Air & Space Power Journal*, March 1, 2010; Li Bin and Nie Hongyi, 〈中美战略稳定性的参考〉 ["Analysis on the Strategic Stability Between China and the United States"], 《世界经济于政治》 [*World Economics and Politics*], Vol. 2, 2008; 李彬 [Li Bin], "The Impact of the U.S. NMD on Chinese Nuclear Modernization," working paper, Seoul: Pugwash Workshop on East Asian Security, April 2001.

38 Michael Glosny, Christopher Twomey, and Ryan Jacobs, *U.S.-China Strategic Dialogue: Phase VII Report*, Monterey, Calif.: Naval Postgraduate School, 2013. For examples of edited volumes that include a mix of Chinese and U.S. authors, see Christopher P. Twomey, ed., *Perspectives on Sino-American Strategic Nuclear Issues*, New York: Palgrave Macmillan, 2008; and Saalman, 2012.

Findings

This report highlights two broad categories of drivers, external and internal. Likely developments in both categories have the potential to drive Chinese nuclear forces, policy, and doctrine in directions that may have negative consequences for global nonproliferation efforts and for other U.S. security interests. Some of the drivers are relatively well understood. For example, U.S.-China nuclear dynamics have been extensively analyzed but nevertheless will continue to pose dilemmas for the foreseeable future. A number of Western analysts accept Chinese arguments that U.S. missile defense pushes China toward higher offensive force levels to ensure a viable retaliatory capability. Yet the United States has other incentives, primarily involving North Korea, to pursue such capabilities. Similarly, China's resource constraints, permitting limited growth in the nuclear inventory without restarting large-scale production of fissile material, are also reasonably well understood, with allowances for technical uncertainty at the margins.

While some variables have received significant treatment, other potential future drivers noted here may be underappreciated. Interviews suggest that Beijing will view a rising nuclear India, for example, very differently from the way it views states that had established nuclear capabilities before China tested its first nuclear weapon. And while Beijing has historically accepted a demonstrably inferior nuclear capability vis-à-vis the United States and Russia, China may wish to maintain a degree of superiority against India. Although Russia is not publicly viewed as a threat, its nuclear policies influence Chinese thinking on global trends. Absent strong central leadership oversight over the details of Chinese strategic decisionmaking—and specifically, one that is committed to continuity with regard to China's strategic nuclear doctrine and policy—the continuing development of Chinese conventional ballistic missiles is likely to influence both the technical capabilities of nuclear missiles and the thinking of missile commanders, whose careers generally involve exposure to both the conventional and nuclear sides of China's strategic missile force.

Organization of This Report

This report is divided into 11 chapters. Chapters Two and Three provide the evolving baseline. Chapter Two summarizes Chinese strategic nuclear concepts, notes differences in Chinese and U.S. perspectives and lexicons, and highlights areas of continuity and contestation (which are discussed further in subsequent chapters). Chapter Three assesses the current situation with regard to Chinese force structure, noting the accelerating pace of modernization apparent in recent years. Chapters Four through Six address the likely external drivers for future change, including China's perception of the general nuclear security environment (Chapter Four), its views of U.S. nuclear pos-

ture and capabilities (Chapter Five), and the nested security dilemmas in which China is embedded regionally (Chapter Six). Chapter Seven treats potential internal drivers of Chinese nuclear forces and policy, including the role of organizational politics and organizational processes. Chapter Eight briefly reviews the extent to which resource constraints might affect nuclear modernization. Chapter Nine looks at the types of impact that the drivers reviewed earlier could have on doctrine and force structure. Chapter Ten describes three scenarios for China's overall nuclear future and the sets of overall conditions under which each might emerge. Chapter Eleven outlines the implications and recommendations for U.S. leaders.

CHAPTER TWO

Baseline: China's Evolving Strategic Nuclear Concepts

To understand where Chinese nuclear forces and policy might go, it is necessary to understand the evolution of Beijing's nuclear thinking to date. Historically, the conceptual thinking that the Chinese leadership has embraced and embedded in policy and doctrine documents has had a profound influence over priorities in nuclear development and procurement. In recent decades, China's material resources would have enabled it to produce a more substantial nuclear arsenal than it has actually deployed, and its thinking on nuclear issues help explain that restraint.[1] Nevertheless, many Chinese nuclear concepts are elastic and allow for significantly divergent interpretation. Indeed, China now appears to be seeking a more calculated approach to effective retaliatory capability, one described here and elsewhere as "assured retaliation." The causal relationship between concepts and material capabilities works both ways, and in the future, improved capabilities may influence Chinese conceptual thinking as much as the reverse. As the PLA assumes a greater role in procurement policy (see Chapter Five), material and technical considerations may increasingly guide strategy.

As is often the case with causality in foreign and security policy, ideas are often enduring but not entirely unchanging, and there is a dynamic relationship between structure (e.g., material potential and constraints) and concepts. In this chapter, we briefly review China's nuclear policy, thinking on deterrence, and nuclear strategy and operational concepts—i.e., the baseline against which future change might be judged. In subsequent chapters, we address potential new or increased pressure on policy, capabilities that might influence thinking, and existing debates about nuclear policy that might change the nature, if not lexicon, of Chinese nuclear deterrence.

Chinese Nuclear Policy

Over the years, Chinese military publications, official statements, and defense white papers have highlighted key elements of China's nuclear policy, including the limited function of nuclear weapons, the country's no-first-use policy, nuclear sufficiency

[1] Fravel and Medeiros, 2010.

based on the principle that forces should be lean and effective, and the requirement for highly centralized command and control of nuclear forces.[2] These concepts form an intellectually consistent whole and are generally mutually supporting, although there is variation in the ways they are discussed in China and some debate among Chinese specialists on the interpretation of some specific elements.

The Function of Nuclear Weapons

The touchstone for Beijing's nuclear policy is its view of nuclear weapons' function in national security. During the Korean War and again in the Taiwan Straits Crisis in the mid-1950s, U.S. officials implicitly, but nevertheless clearly, threatened the use of nuclear weapons against China. As a consequence, China's leader, Mao Zedong, viewed nuclear capability as critical to both deterring nuclear use against China and countering potential coercion by nuclear powers. When Soviet Union Premier Nikita Khrushchev proposed that China should come under the Soviet nuclear umbrella, Mao, believing it was critical for China have its own deterrent, refused.[3] Nevertheless, Mao saw nuclear weapons as distinctly limited in function beyond the two basic purposes cited earlier, and even today, Chinese sources reflect his views on this topic. The 2013 *Science of Military Strategy*, published by the Chinese Academy of Military Science, states simply, "For a long time, the [Chinese] objective of the development and employment of nuclear weapons has focused on the prevention of the use or threat of use of nuclear weapons by hostile states."[4]

Chinese leaders have expressed a largely existential view of the deterrent effects of nuclear weapons. Sun Xiangli, a strategist affiliated with the China Academy of Engineering Physics and the author of *Strategic Choice in the Nuclear Age*, paraphrases the thinking of Chinese Premier Zhou Enlai in 1957: "Developing nuclear strength is chiefly to resolve the [nuclear] 'existential' problem [有无问题], and the scale should not be too great; China is developing nuclear weapons to oppose nuclear threat, not to engage in a nuclear arms race with the nuclear states."[5] That thinking is reflected in recent documents, such as the 2013 *Science of Military Strategy*:

> When China first decided to develop nuclear weapons, it was to break the nuclear powers' nuclear monopoly and was the archetypal existential deterrent strategy [典型的存在性威慑战略]. The development of nuclear weapons since then has also

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2 For a formal definition of China's nuclear policy, which encompasses nuclear development, no-first-use, and arms control policy, see *China Strategic Missile Force Encyclopedia*, 2012, pp. 10–11. Also, see State Council Information Office, *China's Nuclear Defense Strategy*, Beijing, December 2006.

3 Xu Weidi, "China's Security Environment and the Role of Nuclear Weapons," in Li Bin and Tong Zhao, eds., *Understanding Chinese Nuclear Thinking*, Washington, D.C.: Carnegie Endowment for International Peace, 2016, p. 23.

4 Shou Xiaosong, 2013, p. 172.

5 Sun Xiangli, 2013, p. 22.

> abided by the recognition of "you have [them], and I have them too," i.e., the existence of nuclear weapons is itself deterrence. Under the new historical conditions, it is still the nation's strategy and the basic goal of nuclear struggle to better exercise the existential function of nuclear weapons and to contain nuclear threats and the outbreak of nuclear war.[6]

The use of the term *existential deterrent* here (and our use of it below to describe early Chinese nuclear strategy) emphasizes the value of even small nuclear forces. It does not imply any requirement with regard to relative force levels or the certainty of retaliation, as, for example, McGeorge Bundy implied in his own discussions of the term.[7]

The views of early People's Republic of China (PRC) leaders on nuclear weapons continue to constrain discussion. While subscribing to the view that a small number of weapons were sufficient to deter nuclear attack, Mao also believed that nuclear systems were relatively weak weapons against committed people's war.[8] His position evolved away from viewing nuclear weapons as "paper tigers," but he nevertheless viewed them as political rather than militarily useful weapons, and he presided over initial declarations of no-first-use. As we highlight later in the report, the discussion of nuclear weapons and their utility has widened in China, but Mao's views and the policies he put in place remain important even today.

For the most part, Chinese sources suggest that nuclear weapons are intended to address nuclear threats only, rather than to deter the outbreak of war more generally. On this point, *The Science of Military Strategy* is explicit: "Chinese nuclear deterrence cannot be used to deter [慑止] hostile nonnuclear military action, and its function in other nonnuclear military fields is not obvious [不明显]."[9] Sun Xiangli sees the degree of differentiation between nuclear and conventional functions as a distinctive feature of Chinese nuclear policy.[10] Some notable Chinese commentators, however, argue that nuclear weapons have some value in conventional deterrence even if China's no-first-use policy prevents it from making an explicit nuclear threat. Former PLA Second Artillery Force (PLASAF) Deputy Commander Zhao Xijun, for example, notes that even major world powers "become very cautious" in contemplating military intervention against nuclear countries. Additionally, he writes, nuclear weapons can help deter

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6 Shou Xiaosong, 2013, pp. 172–173.

7 See, for example, McGeorge Bundy, "To Cap the Volcano," *Foreign Affairs*, Vol. 48, No. 1, October 1969, and McGeorge Bundy, *Danger and Survival: Choices About the Bomb in the First Fifty Years*, New York: Random House, 1989. For a wider set of definitions, see Rajesh Rajagopalan, "Nuclear Strategy and Small Nuclear Forces: The Conceptual Components," *Strategic Analysis*, Vol. 23, No. 7, 1999.

8 Christopher P. Twomey, *The Military Lens: Doctrinal Differences and Deterrence Failure in Sino-American Relations*, Ithaca, N.Y.: Cornell University Press, 2010, pp. 64–66.

9 Shou Xiaosong, 2013, p. 172.

10 Sun Xiangli, 2013, p. 133.

"medium- and high-power conventional strikes on [China's] important strategic targets and nuclear facilities," and they may come into play in the event of extremely serious threats to national unity, sovereignty, and territorial integrity.[11]

Finally, many Chinese statements convey the idea that nuclear weapons also underpin great-power status. For example, according to the 2013 *Science of Military Strategy*, China's nuclear forces play an important role in "guaranteeing that [China's] status as a powerful country does not waver, making sure that its core national interests are not violated, and creating a secure environment for [China's] peaceful development."[12] In announcing the creation of the Rocket Force in December 2015, Xi Jinping echoed the point, emphasizing, "the Rocket Force is our country's core strategic deterrent force; it is the strategic support for our country's major power status; and it is an important foundation for safeguarding our nation's security."[13]

No-First-Use

Chinese sources highlight the role of Beijing's nuclear no-first-use pledge as central to all other aspects of its nuclear policy. On October 16, 1964, the day of China's first nuclear test, the Chinese government declared, "China will not at any time or under any circumstances employ nuclear weapons first."[14] Since 1964, Beijing has reaffirmed its no-first-use pledge many times. China's 2015 defense white paper states that "China has always pursued the policy of no first use of nuclear weapons and adhered to a self-defensive nuclear strategy that is defensive in nature."[15] *First use*, in this context

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11 赵锡君 [Zhao Xijun], ed., 《慑战: 导弹威慑纵横谈》 [*Intimidation Warfare: A Comprehensive Discussion of Missile Deterrence*], Beijing: 国防大学出版社 [National Defense University Press], 2005, pp. 41–42.

12 Shou Xiaosong, 2013, p. 148.

13 〈陆军领导机构火箭军战略支援部队成立大会在京举行: 习近平向中国人民解放军陆军火箭军战略支援部队授予军旗并致训词〉 ["Meeting to Establish the PLA Army General Command, Rocket Force, and Strategic Support Group Held in Beijing: Xi Jinping Confers Flag and Makes Address"], 《人民日报》 [*People's Daily*], January 2, 2016.

14 *China Strategic Missile Force Encyclopedia*, 2012, p. 11.

15 State Council Information Office, 2015. China's 2013 white paper (State Council Information Office, *The Diversified Employment of China's Armed Forces*, Beijing, April 2013) differed from past versions in that it did not explicitly mention the no-first-use policy. Some observers initially interpreted this omission as at least an implicit departure from no-first-use, if not an outright rejection of the policy. See James M. Acton, "The Underground Great Wall: An Alternate Explanation," proliferation analysis, Washington, D.C.: Carnegie Endowment for International Peace, 2011. But PLA officers have noted that the "thematic" approach of the April 2013 document was a departure from the "comprehensive" format of previous white papers, and hence a discussion of no-first-use was not required. More importantly, since its publication, several Chinese officials and military officers reiterated that the no-first-use policy has not changed. For example, responding to a question during a June 2013 press conference, Ministry of Foreign Affairs spokesperson Hong Lei restated China's long-standing nuclear policy, including that China "firmly pursues a nuclear strategy solely for self-defense, adheres to the policy of no-first-use of nuclear weapons at any time and under any circumstance, and makes the unequivocal commitment that it will unconditionally not use or threaten to use nuclear weapons against non-nuclear weapons states and nuclear-weapon-free zones." See Ministry of Foreign Affairs of the People's Republic of China, "Foreign Minis-

of China's no-first-use policy, refers to the first use of nuclear weapons by others. The *China Strategic Missile Force Encyclopedia* states, "it only requires that an enemy does not employ [nuclear weapons] for China to also not employ them."[16] Thus, *first use* is defined by the weapon employed and not by the assets targeted. In principle, this means that a nuclear attack against Chinese conventional (or any other) assets would be regarded as first use, while conventional attacks against Chinese nuclear systems (or support systems, such as nuclear command and control infrastructure) would not. This definition has been confirmed by Chinese interlocutors during track 2 dialogues with Chinese nuclear strategists, although some participants also acknowledge internal Chinese debates (discussed further in Chapter Nine) about whether some conditionality should be attached.[17] Western analysts, meanwhile, ask whether such a strict distinction would be tenable in an actual conflict. The continued adherence to a strict definition of no-first-use indicates a strong desire to avoid "mission creep" in the nuclear domain, even if there are doubts about whether strict limits could be maintained in all cases or debates about whether it is in China's interest to continue to adhere to the limits.

Finally, most Chinese sources that discuss the no-first-use policy are emphatic that China will employ nuclear weapons should nuclear weapons be used against it. The 1987 *Science of Military Strategy* states, "China's nuclear strategy is defensive in nature, but if an enemy is first to use nuclear weapons, China will resolutely implement a nuclear counterstrike and carry out nuclear retaliation."[18]

Nuclear Sufficiency: Lean and Effective Forces and Assured Retaliation

A second pillar of Chinese nuclear policy is its standard of sufficiency, which Chinese documents discuss in terms of building a nuclear force that is lean and effective [精干有效].[19] This phrase was first employed publicly in the 2006 defense white paper.[20]

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try Spokesperson Hong Lei's Regular Press Conference on June 3, 2013," June 4, 2013. PLA officers have made similar statements, such as when Lieutenant General Qi Jianguo reaffirmed the no-first-use policy at the Shangri-La Dialogue in Singapore in June 2013. "I want to make a solemn statement that the Chinese government will never discard our pledge of no first-use of nuclear arms," Qi said. "We have been sticking to this policy for half a century, and its facts have proven that it is not only in the interest of the Chinese people but also of the people of all the world." See "Shangri-La Dialogue: China Reiterates 'No First Use' Nuclear Pledge," *Straits Times*, June 2, 2013.

16 *China Strategic Missile Force Encyclopedia*, 2012.

17 Discussions with Chinese nuclear strategists, Beijing, November 9, 2010.

18 高锐 [Gao Rui], ed., 《战略学》 [*The Science of Military Strategy*], 1st ed., 军事科学出版社 [Beijing: Military Science Press], 1987, p. 237.

19 State Council Information Office, *China's National Defense in 2010*, Beijing, March 31, 2011. See also 靖志远 [Jing Zhiyuan], 〈建设精干有效战略导弹部队为维护世界和安全贡献力量〉 ["Creating a Lean and Effective Strategic Missile Troop Contributes to International Security], 《中国军队》 [*China Military*], Vol. 6, No. 2, 2010, pp. 4–7.

20 State Council Information Office, 2006.

But the idea that the scale of China's nuclear forces should be limited dates back to the inception of the country's nuclear-weapon program in the 1950s. As noted earlier, Premier Zhou Enlai stipulated that the scale of the nuclear force "should not be unsuitably large."[21] Recent explanations of *lean and effective*, such as the 2006 white paper, also emphasize Chinese restraint, the modest size of its nuclear forces, and the desire to avoid costly arms races.[22]

Western analysts frequently describe China's approach to nuclear strategy and sufficiency as one of "minimum deterrence."[23] The standard of sufficiency is the ability to survive an enemy first strike and launch an effective counterattack. As Chinese military scholar Major General Yao Yunzhu notes, "To keep the arsenal lean, China has to exercise restraint in developing nuclear weapons; to keep the arsenal effective, China has to modernize it to ensure credibility after a first nuclear strike."[24] Sun Xiangli, of China Academy of Engineering Physics, cautions that the Chinese standard differs somewhat from European Cold War minimum deterrent strategies. The Chinese lean-and-effective concept does not impose specific minimum or maximum numerical limits on warheads. Unlike the English or French minimum deterrent concepts, it does not require a specific threshold level of destruction to the population or industrial capacity of potential adversaries. Instead, China's concept of unsustainable damage is more subjective and has a much lower threshold—based in part on a concept of "mutual fragility."[25]

But while the level of damage that Chinese officials say might be necessary for a counterattack may not be high by European or U.S. Cold War standards, both the 2013 *Science of Military Strategy* and the 2013 defense white paper focus more on required improvements to the nuclear force than they do on ensuring that the force remains lean.[26] The 2013 *Science of Military Strategy*, for example, highlights the need to improve informatization of systems, command and control, early warning and

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21 Sun Xiangli, 2013, p. 22.

22 State Council Information Office, 2006. The concept of effectiveness of the nuclear deterrent force that is highlighted in recent publications can also be traced back to earlier volumes, such as the 1987 edition of *Science of Military Strategy*, which underscores that "China's nuclear counterstrike must take effectiveness as the foundation." See Gao Rui, 1987, p. 116.

23 Jeffrey Lewis, *The Minimum Means of Reprisal: China's Search for Security in the Nuclear Age*, Cambridge, Mass.: MIT Press, 2007.

24 Yao Yunzhu, 2010.

25 Sun Xiangli, 2013, pp. 137–139.

26 Shou Xiaosong, 2013; and State Council Information Office, 2013. In describing the environment, the 2013 *Science of Military Strategy* highlights not only missile defense but also CPGS [*kuaisu quanqiu daji*] as serious concerns for Chinese planners. In particular, it identifies CPGS as a potential conventional strike threat against Chinese nuclear forces, which could put China in a "passive position" [*beadong diwei*] and could "greatly influence China's nuclear counterattack capability" [*dada yingxiang wo he fanji nengli*] and "weaken China's nuclear deterrent function."

rapid response capability, penetration capability, and defense and survivability.[27] Some Chinese individuals and sources suggest that increasing the size of China's nuclear inventory may be necessary. The 2013 *Science of Military Strategy* stipulates that, when combined with other improvements, increasing the number of intercontinental ballistic missiles (ICBMs) and deploying missiles with multiple warheads will enhance the effectiveness of China's deterrent.[28]

This may, in part, simply reflect the application of existing concepts and thought, specifically the requirement for a lean-and-effective force, to modern problems and the increasingly "complex nuclear security environment" China faces today. Sun Xiangli argues, "The stability of [Chinese] nuclear strategic thought . . . certainly does not mean that the scale or employment posture of Chinese nuclear forces will not change" as circumstances change.[29] But there does appear to have been a shift in thought away from the existential view of deterrence cited earlier toward a more calculated approach—one that has been labeled "assured retaliation" by recent Western observers.[30] To be sure, China never explicitly or uniformly embraced existential deterrence, and recent Chinese strategists have yet to articulate a standard of retaliatory destruction against which sufficiency is measured, if such a standard exists. But both the direction of Chinese thinking and its deployed nuclear forces suggest a changing balance between emphasis on "lean," on the one hand, and "effective," on the other. As Chapter Three and other, more-technical analyses suggest, China's retaliatory capability has grown far more certain and robust in recent years, despite new challenges, so changing perspectives may partly reflect capability—i.e., China can now achieve a calculated assured retaliatory capability, so ensuring that it does so has become a priority.[31]

Centralized Command and Control

Chinese statements insist that nuclear command and control must be highly centralized, with all the important decisions resting in the hands of the nation's top political and military leadership. This imperative derives from the enormous power of nuclear weapons, their political nature, Leninist views of leadership and authority, and his-

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[27] Shou Xiaosong, 2013, p. 148. Former PLASAF deputy commander Zhao Xijun (2005, p. 78), enumerates a similar list of required improvements.

[28] Shou Xiaosong, 2013, pp. 233–234.

[29] Sun Xiangli, 2013, p. 187.

[30] Fravel and Medeiros, 2010, pp. 48–87; Cunningham and Fravel, 2015.

[31] For an effort to model second-strike capability in the fact of an adversary first strike, see Eric Heginbotham, Michael Nixon, Forrest E. Morgan, Jacob L. Heim, Jeff Hagen, Sheng Li, Jeffrey Engstrom, Martin C. Libicki, Paul DeLuca, David A. Shlapak, David R. Frelinger, Burgess Laird, Kyle Brady, and Lyle J. Morris, *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power, 1996–2017*, Santa Monica, Calif.: RAND Corporation, RR-392-AF, 2015, pp. 285–319.

torical concerns about nuclear weapons falling into the hands of separatists.[32] China's no-first-use policy and its strategy of retaliation, rather than launch on warning or nuclear warfighting, provide permissive context. The 2006 defense white paper states that "China's nuclear force is under the direct command of the Central Military Commission (CMC)."[33] The 2013 *Science of Military Strategy* emphasizes that all decisions about nuclear force employment, whether for deterrence operations or nuclear counterattacks, must be made by the CMC. In the event of a nuclear counterattack, the CMC would make all the key decisions, including scale, timing, and targets.[34] Similarly, according to Zhao Xijun, nuclear missile deterrence actions must be conducted with great caution, and the Supreme Command must make all the relevant decisions.[35]

Chinese Views on Deterrence

Chinese military doctrinal texts highlight deterrence as a means of protecting China's national security interests, including safeguarding what Chinese leaders define as an ongoing "period of strategic opportunity" for China's development in the early part of the 21st century. According to the 2013 *Science of Military Strategy*, PLA "preparations for military struggle" must not only improve the PLA's ability to win future local wars but also "strive to establish and strengthen a military deterrence system and military deterrence capability to contain the outbreak of war and prevent the escalation of war."[36] Within this broader context, PLA publications stress the importance of linking deterrence actions to political objectives. According to one source, "Deterrence, like war, is a continuation of politics."[37] The fundamental purpose of deterrence is to influence an adversary's decisionmaking calculus.[38]

Strategic deterrence is not synonymous with nuclear deterrence in Chinese military writings.[39] The military component of strategic deterrence relies not only on nuclear weapons, but also space, cyber warfare, and conventional military capabilities.[40]

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32 Chong-Pin Lin, *China's Nuclear Weapons Strategy: Tradition Within Evolution*, Lanham, Md.: Lexington Books, 1988, p. 91.

33 State Council Information Office, 2006.

34 Shou Xiaosong, 2013, p. 228.

35 In contrast, conventional missile deterrence is "more flexible," and faces fewer restrictions; with conventional missiles, "a few actual missile launches" may help achieve the deterrence objectives (Zhao Xijun, 2005, p. 41).

36 Shou Xiaosong, 2013, p. 134.

37 Zhao Xijun, 2005, p. 9.

38 Zhao Xijun, 2005, p. 12.

39 Dennis Blasko, "Military Parades Demonstrate Chinese Concept of Deterrence," *China Brief*, Vol. 9, No. 8, April 16, 2009.

40 Shou Xiaosong, 2013, pp. 137–140.

Chinese military publications suggest that, even though conventional military deterrence is not as powerful as nuclear deterrence, it is becoming more important as conventional weapons become more capable. The 2013 *Science of Strategy* contains a discussion of the "conventionalization of deterrence." It notes that, given the improvements to conventional weapons since the end of the Cold War, they have "become a powerful deterrence means for achieving political objectives."[41] The authors contend that conventional weapons are becoming more and more capable and offer much greater flexibility than nuclear weapons. Nevertheless, Chinese strategists continue to see nuclear deterrence as fundamental to national security.

Like their American counterparts, Chinese strategists emphasize that a successful deterrent threat requires capability, will, and effective communication with the adversary.[42] According to Zhao Xijun, "deterrence must take reliable strength as its foundation."[43] Capability is thus seen as the most fundamental and important of these three elements of deterrence.[44] The will to use force is also critical. Even powerful capabilities cannot effectively deter an enemy without the determination to use them. There are many possible channels to convey determination, such as statements by leaders, official or unofficial media outlets, hotline phone calls, passing messages via third countries, or "directly through an enemy's spies or satellite overflights."[45] The information era, according to this narrative, affords more options for conveying determination, thus creating a "wider space for the application of deterrence."[46]

Chinese writers focus primarily on displaying the will and capability to use force as the key means of deterring an enemy, but some also note that the actual use of force can influence future deterrent calculations. Former Second Artillery Force Deputy Commander Zhao Xijun has written that deterrence in a given case can be influenced by judgments made previously about the likely results of military contention. Consequently, Zhao suggests, the actual use of force can be employed to influence an adversary's future strategic judgment. He cited Israel's 1981 attack against Iraq's Osirak nuclear reactor as an example of a military operation that also played a role in deterring future behavior.[47]

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41 Shou Xiaosong, 2013, pp. 137–138.

42 Peng Guangqian and Yao Youzhi, 2001, pp. 213–215. See also Zhao Xijun, 2005, pp. 3–5, 9–10.

43 Zhao Xijun, 2005, p. 83.

44 Shou Xiaosong, 2013, pp. 135–137.

45 Zhao Xijun, 2005, p. 99.

46 Zhao Xijun, 2005, pp. 3–5, 39. Specifically, China could use radio, TV, newspapers, and the Internet to transmit information about its deterrence actions to an adversary. In addition, China could deliberately reveal information to an adversary by exposing its actions to enemy intelligence, surveillance, and reconnaissance (ISR) satellites or reconnaissance aircraft.

47 Zhao Xijun, 2005, pp. 10–11.

Of note, the Chinese term *weishe*, generally translated as *deterrence*, has a broader meaning that also encompasses what political science theorists typically refer to as *compellence*. Accordingly, it is perhaps more appropriate to think of *weishe* as roughly equivalent to Thomas Schelling's broader concept of *coercion*, which includes deterrence and compellence.[48] This difference in terminology complicates the development of mutual understanding by the two sides. Although Chinese strategists are perfectly capable of adding language clarifying the intended type of coercion being discussed, they often do not do so, and the meaning can be ambiguous without it. Perhaps more important, the coercive frame of reference places more emphasis on ratcheting up psychological pressure and less on clarity of messaging than is generally found in Western concepts of deterrence. Nevertheless, as one Chinese analyst observes, the distinction between deterrence and compellence may be overdrawn by Western scholars and not always followed by practitioners; in point of fact, it is often difficult to agree which party is defending the status quo and which party is challenging it.[49]

Despite the growing importance of conventional forces, Chinese military publications suggest that Beijing sees nuclear deterrence as one of the most important forms of strategic deterrence. Zhao argues that the deterrence effects of nuclear missiles are unmatched by any other weapons.[50] Even with a relatively limited nuclear force, as long as China is capable of retaliating in the event of a nuclear attack, it has the ability to deter a stronger adversary. As Zhao puts it, although China has a limited number of strategic missiles, the consequences of Chinese nuclear retaliation would be strong enough to guarantee that the enemy would stand to lose much more than it would gain.[51] As long as strategic missiles are survivable and have strong penetration capabilities, an enemy would face an enormous risk if it attempted to launch a nuclear strike.[52]

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48 On the distinctions between deterrence and compellence, see Thomas C. Schelling, *Arms and Influence*, New Haven, Conn.: Yale University Press, 1966, pp. 69–78. According to Li Bin, "'weishe' does not mean deterrence; 'weishe' means coercion: to force others to yield to oneself." See Li Bin, "China's Nuclear Strategy," presentation at the Carnegie Endowment for International Peace Nonproliferation Conference, Washington, D.C., June 25, 2007. Similarly, according to the *Science of Second Artillery Campaigns* (Yu Jixun, 2004, p. 270), the goal of missile force campaign deterrence operations is to "compel an enemy to accept our will or to contain an enemy's hostile actions." This appears to include not only deterrence ("contain an enemy's hostile actions") but also compellence or coercive diplomacy ("compel an enemy to accept our will").

49 Li Bin, "Differences Between Chinese and U.S. Nuclear Thinking and Their Origins," in Li Bin and Tong Zhao, eds., *Understanding Chinese Nuclear Thinking*, Washington, D.C.: Carnegie Endowment for International Peace, 2016, p. 10.

50 Zhao Xijun, 2005, pp. 29–32.

51 Zhao Xijun, 2005, pp. 29–30.

52 Zhao Xijun, 2005, pp. 85–86.

Escalation and War Control

Chinese military publications suggest that regional wars will begin as limited conventional conflicts, and neither side is likely to seriously consider nuclear threats or the use of nuclear weapons early in the conflict. But as war escalates, "the use of nuclear deterrence becomes a possibility."[53] Consequently, PLA publications underscore the view that modern regional conflicts involving a nuclear-armed adversary will most likely take the form of "local wars under nuclear deterrence conditions." The *Chinese Strategic Missile Force Encyclopedia* defines such conflicts as "local conventional wars backed by nuclear force."[54] Under these circumstances, the readiness of nuclear weapons is likely to be increased; military forces of one or both sides will be "constantly under the threat of nuclear attack"; and there is a serious possibility that the conflict will escalate to the nuclear level.[55] Within this context, there are four ways a peacetime crisis or regional war might escalate to the nuclear level:

- An extremely serious international crisis takes place, and a nuclear imbalance between the countries involved leads one side or the other to believe that a nuclear first strike will allow it to seize the initiative or accomplish its strategic objectives.
- Conventional war escalates to the nuclear level because "a hegemonic nation that possesses nuclear weapons" is losing a conventional war and concludes that it must "use nuclear weapons to reverse the situation" or because a country that does not have a no-first-use policy and believes its national survival is at stake resorts to nuclear escalation.
- "Political errors" lead to nuclear war because "the enemy makes an erroneous strategic judgment on certain actions, and takes drastic action that causes the situation to go out of control and leads to nuclear war."
- "Accidental nuclear war" takes place when, as a result of command and control errors or malfunctioning weapon systems, "one country mistakenly launches nuclear missiles on the territory of another country."[56]

According to Zhao Xijun, once a conventional conflict is under way, nuclear deterrence can help prevent the conventional war from escalating to the nuclear level, and if that fails, it can help deter a limited nuclear exchange from "further escalating."[57] "When the enemy employs high-tech conventional strikes or considers using nuclear weapons," Zhao writes, "they have to face the fact that the other side has nuclear weap-

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53 Zhao Xijun, 2005, p. 35.

54 *China Strategic Missile Force Encyclopedia*, 2012, p. 41.

55 *China Strategic Missile Force Encyclopedia*, 2012, p. 41.

56 These four escalation paths are outlined in the entry under "Nuclear War Driving Factors" [核战争驱动因素] in *China Strategic Missile Force Encyclopedia*, 2012, p. 3.

57 Zhao Xijun, 2005, p. 47.

ons" and is capable of retaliating effectively. The risk of escalation and the possibility of nuclear retaliation mean the enemy must make decisions very carefully.[58]

A number of sources suggest that the degree of deterrence must be appropriate to achieve the desired effects without creating unintended consequences. The 2013 *Science of Military Strategy*, for example, cautions that, if China fails to adopt "the correct degree" of deterrent threat, "we may, when there are dynamics between the enemy and ourselves, have the opposite effect, and prompt escalation that could lead to a nuclear clash."[59] Similarly, the authors suggest that, in demonstrating resolve, "we must move in keeping with the enemy and not take the initiative in raising the level of nuclear confrontation between the enemy and ourselves."[60] This does not mean that China will never take the lead in nuclear posturing, but it does indicate an awareness of escalation problems and an emphasis on proportionality and caution.

Chinese Nuclear Strategic and Operational Concepts

China publishes little on its nuclear strategy in a specific geographic or political context, but Chinese strategists emphasize that nuclear strategy should flow from larger national strategy. According to China's 2006 defense white paper, "China's nuclear strategy is subject to the state's nuclear policy and military strategy."[61] Because of the unique nature of nuclear weapons, nuclear strategy is under the direct guidance of national strategy and is thus subject to higher-level policy and strategy considerations.[62] Although China is largely silent on the details of nuclear strategy, it publishes much more on general conceptual subjects at the campaign and operational levels. In the following subsections, we briefly outline principles of PLASAF campaigns and discuss two types of operations: nuclear deterrence and nuclear counterattack.

General Principles

The 2004 *Science of Second Artillery Campaigns* and the 2012 *China Strategic Missile Force Encyclopedia* discuss an identical set of ten general principles that should guide the conduct of Second Artillery campaigns:[63]

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58 Zhao Xijun, 2005, p. 31.

59 Shou Xiaosong, 2013, p. X. Zhao Xijun similarly cautions that the strength of deterrence measures must be appropriate to the occasion. On the one hand, if the degree of deterrence is too light, it will be insufficient to influence the enemy's decision calculus, resulting in a deterrence failure. On the other, "if the degree of deterrence is too heavy, the deterred may risk danger out of desperation due to the unbearable psychological pressure," thus triggering escalation. See Zhao Xijun, 2005, p. 35.

60 Shou Xiaosong, 2013.

61 State Council Information Office, 2006.

62 Zhao Xijun, 2005, p. 76.

63 Yu Jixun, 2004, pp. 130–137; *China Strategic Missile Force Encyclopedia*, 2012, p. 71.

1. *Unified command.* Given their strategic and political significance, missile units should strictly follow commands under the overall instructions of the Supreme Command.
2. *Advanced preparation.* Given the complexity and difficulties of missile campaigns, missile operations must proceed according to plans prepared during peacetime.
3. *Meticulous planning.* Because of the quick operational tempo during active operations, peacetime preparation of wartime support measures should be thorough and realistic.
4. *Integrated deterrence and warfare.* Nuclear forces will have to deter nuclear attack as conventional forces engage in operations. Success will depend on the scaling of forces, functioning of equipment, and training of commanders and command systems.
5. *Strict protection.* In wartime, missile units could be key targets for enemy attacks, and there will be a premium on measures to ensure survivability, even as the forces remain prepared to undertake counterstrike missions.
6. *Concentrated employment.* The concentration of weapons is key to success during campaigns. Firepower plans should ensure concentrated attacks against key targets.
7. *Rapid response.* Modern campaigns develop rapidly, and commanders must be able to grasp opportunities quickly, in keeping with the intent of superior officers.
8. *Close coordination.* In joint campaigns, missile force commanders must coordinate with elements of the other services. In independent campaigns, missile and munitions bases should coordinate, with the missile base as the central hub. Launch units and support elements should coordinate with launch elements as the hub.
9. *Comprehensive support.* Given the dispersed nature of missile force operations, a complete and comprehensive support system must be developed and maintained.
10. *Political work.* Political work, including patriotic education and the maintenance of military democracy, is a positive tradition and can help overcome enemies.

Nuclear Deterrence Operations

Conducting deterrence operations is a core function of China's strategic missile force. PLA officers write that missiles are uniquely suited to this mission because of their ability to launch rapidly, penetrate enemy missile defense systems, and destroy key targets. Chinese military publications indicate that deterrence actions, like all other military activities, should be closely linked with China's broader "political and diplomatic struggles."[64] This link is key to gaining international support, frustrating the enemy's plans, and creating a favorable strategic situation for China.[65]

[64] Zhao Xijun, 2005, p. 81.

[65] Zhao Xijun, 2005, p. 81.

The *Science of Second Artillery Campaigns* defines "Second Artillery campaign deterrence" [第二炮兵战役威慑] as a series of military activities in which missile force units "create momentum and demonstrate strength" [造势和显势] to "compel an enemy to accept our will or to contain an enemy's hostile actions."[66] PLA publications suggest that, when facing a more powerful enemy, China should display both real and false capabilities to confound enemy decisionmaking. The 2013 *Science of Military Strategy* notes superior U.S. and Russian capabilities and argues that a degree of ambiguity can "increase the difficulty of adversaries' strategic decisionmaking and increase the effectiveness of China's limited nuclear forces."[67] Decoys and fake positions can be used to increase the enemy's perceptions of one's own strength, and multiple spokesmen or transmission sources can broadcast different messages.

Chinese military publications indicate that missile force units can use a variety of methods to influence enemy decisionmakers.[68] The approaches discussed in these volumes include media propaganda, raising the level of weapon readiness, displaying strength, using the troops to build momentum, exercise launches and warning strikes, and lowering the nuclear threshold.

Media Propaganda

One of the most important deterrent methods is media propaganda (exerting pressure through public opinion), and it may be employed in peace or war. During war, China can use media propaganda to issue "grave warnings" to the enemy to deter them from making nuclear threats against China or from carrying out strategic conventional attacks against particularly sensitive targets.[69] Early in a crisis, nonauthoritative media may be the most appropriate channel for transmitting warnings, while authoritative media can be employed subsequently, if needed, to raise the intensity of pressure.[70]

Raising Readiness Levels

Another method discussed in *Intimidation Warfare* and *Science of Second Artillery Campaigns* is raising the level of weapon preparation, which involves increasing missile and warhead technical readiness and elevating the level of missile launch readiness.[71]

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66 Yu Jixun, 2004, p. 270. The language reflects the broader meaning of *weishe* in that in appears to include not only deterrence ("contain an enemy's hostile actions") but also compellence or coercive diplomacy ("compel an enemy to accept our will"). The authors stress that campaign deterrence operations constitute an important component of the Second Artillery's mission of "dual deterrence and dual operations" [双重威慑,双重作战].

67 Shou Xiaosong, 2013, p. 173.

68 Yu Jixun, 2004, pp. 281–296; Zhao Xijun, 2005, pp. 180–187.

69 Zhao Xijun, 2005, pp. 180–182.

70 Zhao Xijun, 2005, pp. 180–181. Zhao notes that it is important to "ensure the appropriate intensity of deterrence, knowing when to stop escalating, and quitting when one is ahead," so as to avoid an excessive media reaction that might strengthen the enemy's resolve or even trigger unintended escalation of the conflict.

71 Zhao Xijun, 2005, p. 182; Yu Jixun, 2004.

Measures may include the assembly, inspection, and testing of missiles and warheads. Because such preparations are usually conducted in tunnels or other concealed areas, the process should be recorded, and the video should be disseminated to create the desired deterrent effect.[72]

Displaying Strength

Chinese sources suggest that deterrence "is mainly conducted through show of force and posturing."[73] One of the most important campaign deterrence methods for the missile force is, therefore, "displaying strength" [实力展示]. For example, Second Artillery can send commanders to inspect or review the troops, providing opportunities to publicize capabilities. National day parades also provide opportunities for nuclear powers to display nuclear missile forces. Defense attachés, foreign military officers, and reporters may be invited to visit weapon storage sites, launch pads, and silos (although only those that have already been exposed).

Using the Troops to Build Momentum

Closely related to demonstrating strength is the concept of "using the troops to build momentum" [兵力造势]. According to *Science of Second Artillery Campaigns* and *Intimidation Warfare*, "building momentum" refers to the use of troop deployments to create advantage, largely by confusing the enemy about China's operational intentions.[74] Maneuvering missile launchers and support vehicles when the enemy's reconnaissance satellites are about to pass overhead can enhance deterrence by showing enemy leaders that PLA missile forces are prepared to conduct combat operations. Real and feint maneuvers, employing fake missiles and other equipment, and simulated missile launches can be combined to create the impression that a larger force is involved than is actually the case or that China's missile force has reached a heightened state of preparedness.[75]

Exercise Launches

According to authoritative Chinese sources, launching missiles at predetermined ground or sea targets could also place psychological pressure on enemy decisionmakers. One option is test-launching missiles close to enemy territory or ships. Conducting "test launches from both flanks" (i.e., launching missiles at two or more important enemy targets) could further heighten the pressure, as could launching a missile across an enemy-held island. Still another option is launching one or more missiles close to

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72 Zhao Xijun, 2005, p. 183.

73 Zhao Xijun, 2005, pp. 91–92, 129–130.

74 Zhao Xijun, 2005, pp. 184–186; Yu Jixun, 2004.

75 Yu Jixun, 2004, pp. 289–290.

an enemy aircraft carrier that may be intruding into Chinese territorial waters.[76] These missiles presumably would not carry nuclear warheads, but the launches could convey an implicit nuclear threat.

Lowering the Nuclear Threshold

The final campaign deterrence method discussed in *Science of Second Artillery Campaigns* is "lowering the nuclear deterrence threshold" or "adjusting nuclear policy."[77] Lowering China's nuclear *deterrence* threshold is not necessarily the same as lowering its nuclear *use* threshold, and there has been considerable debate on exactly what this provision means. The main emphasis of nuclear deterrence is to impose psychological fear on the enemy to deter conventional strikes. It involves increasing Chinese readiness to demonstrate resolve, *not* using nuclear weapons first or launching nuclear counterattacks.[78] The authors suggest that China could announce that it is dropping or placing conditions on its long-standing no-first-use policy and discuss four conditions under which that might be appropriate:[79]

- An enemy is threatening to carry out conventional strikes against China's nuclear facilities or nuclear power stations.
- An enemy is threatening to carry out attacks against major strategic targets, such as hydroelectric power stations.
- An enemy is threatening to carry out attacks against the capital, major cities, or other political or economic centers.[80]
- China is facing serious danger or impending disaster because it is losing a conventional military conflict in which the stakes are very high.[81]

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[76] In addition to creating psychological pressure or even panic on the enemy side and producing the desired deterrence effects, launch exercises involve firing real missiles and thus have the added benefit of testing the operational capabilities of missile force units.

[77] Yu Jixun, 2004, p. 294.

[78] Wu Riqiang, 《中美核关系中的生存, 威压与升级》 [*Issues in Sino-U.S. Nuclear Relations: Survivability, Coercion and Escalation*], United Kingdom Foreign & Commonwealth Office, June 21, 2013.

[79] Yu Jixun, 2004, pp. 294–295.

[80] Specifically, they state that this method could be used when a powerful nuclear-armed enemy that enjoys conventional military superiority conducts continuous medium- or high-intensity air raids against major strategic targets in China. Under such circumstances, the Supreme Command could choose to "adjust" China's long-standing no-first-use nuclear deterrence policy and order the missile force to "actively carry out powerful nuclear deterrence against the enemy to deter the enemy from continuously launching conventional air raids against [China's] major strategic targets" (Yu Jixun, 2004, pp. 294–295).

[81] When a conventional conflict is continuing to escalate and when the overall strategic situation is becoming extremely disadvantageous for China, national safety and survival may be seriously threatened. In such a situation, the Supreme Command could adjust China's nuclear policy and order nuclear missile force units to carry out effective deterrence against the enemy.

If the threat to China is severe enough, Beijing can increase pressure further by revealing the aimpoints of its nuclear weapons. Disclosing the potential targets of nuclear strikes represents the "highest level of deterrence."[82]

There are some important points to consider with regard to how this deterrence measure should be interpreted. First, most other sources do not mention lowering the deterrence threshold. For example, it is not mentioned in *China's Strategic Missile Force Encyclopedia*, which was published approximately eight years after the *Science of Second Artillery Campaigns*.[83] It is possible that the measure has been dropped as potentially destabilizing or inconsistent with Chinese policy. Alternatively, the measure might simply be regarded as too sensitive to mention in open sources. The *Science of Second Artillery Campaigns*, the source in which this measure is mentioned, is a classified publication under the Chinese system, whereas *China's Strategic Missile Force Encyclopedia* is openly published. Second, even if an adversary uses conventional weapons to attack China's nuclear force, the *Science of Second Artillery Campaigns* does not advocate a nuclear counterattack. It affirms China's no-first-use stance but embraces options to lower China's nuclear deterrence threshold.[84]

Nevertheless, even as described and caveated as it is in the *Science of Second Artillery Campaigns*, lowering the nuclear threshold is problematic from a number of perspectives, not least because it could be highly escalatory. If China's no-first-use policy is intended, in part, to diminish the uncertainties that might lead to nuclear escalation, much of the value of that policy could be lost in China's intentional ambiguity on lowering the nuclear threshold. This disconnect suggests a significant area of ambiguity and tension in Chinese nuclear thinking, one that also runs through other measures that involve confusing and confounding adversary leaders.

Nuclear Counterattack Campaigns

In keeping with China's no-first-use policy, the nuclear counterattack campaign is the only type of nuclear strike campaign discussed in Chinese military publications.[85] The 2006 *Science of Military Campaigns* defines such campaigns as

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82 Yu Jixun, 2004, p. 294.

83 The encyclopedia's discussion of campaign deterrence measures is limited to (1) raising the weapon readiness level, (2) show of strength, (3) creating momentum with troops, (4) missile launch exercises, and (5) public opinion and propaganda. See *China Strategic Missile Force Encyclopedia*, 2012, p. 80.

84 Yu Jixun, 2004, p. 298.

85 As Yu Jixun explains, the nuclear counterattack campaign was first defined in *The PLA Second Artillery Military Terms*, published in March 1984. The definition was subsequently refined in other publications, including the 1985 edition of《第二炮兵战役学》[*Science of Second Artillery Campaigns*]; 《第二炮兵战役法》[*Second Artillery Campaign Methods*] and 《第二炮兵战役教程》[*Second Artillery Campaigns Teaching Materials*], which were published in 1996; and 《中国军事百科全书》[*Chinese Military Encyclopedia*], 1997. Source titles listed in Yu Jixun, 2004, pp. 40–41.

> the series of nuclear missile strikes and related operational activities of a large Second Artillery nuclear campaign formation, strictly carried out under the direct command and control of the Supreme Command, in accordance with the intent of the Supreme Command, to achieve specially designated strategic goals.[86]

Chinese military publications state that the nuclear counterattack campaign could be carried out either independently or as part of a "joint nuclear counterattack campaign" [*lianhe hefanji zhanyi*] in coordination with the nuclear forces of the other services.[87] PLASAF (and since December 2015, the Rocket Force) has been expected to constitute the main force in such a joint campaign, although the deployment of *Jin*-class submarines may give PLAN a larger role than it has had previously.[88]

Chinese military publications delineate the mission, characteristics, and guiding principles of nuclear counterattack campaigns. According to *Campaign Theory Study Guide*, the basic mission of a nuclear counterattack campaign is "to thwart the enemy's strategic designs, shake the enemy's will, paralyze the enemy's command systems, retard the enemy's operational activities, weaken the enemy's war potential, and deter the escalation of nuclear warfare."[89] Of note, military publications indicate that nuclear targets would include a wide range of countervalue and military targets, such as enemy political and economic centers and important military bases, but not nuclear counterforce targets (such as enemy ICBM silos). China's thinking on targeting could change as its missiles become more accurate and as it contemplates the possibility of conflict with potential adversaries that do not have the robust nuclear capabilities the United States does, a topic discussed further in subsequent chapters.

Chinese military publications also highlight key characteristics of nuclear counterattack campaigns that set them apart from other types of campaigns.[90] Notably, the battlefield environment is said to be extremely harsh, at least partly because the no-first-use policy assumes that a nuclear campaign would be executed only after China had suffered an enemy nuclear attack.[91] Targets in China would likely include nuclear com-

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86 The definition of the nuclear counterstrike campaign in Zhang Yuliang (2006), p. 617, is very similar to the definitions offered in 薛兴林 [Bi Xinglin, ed.], 《战役理论学习指南》 [*Campaign Theory Study Guide*], 国防大学出版社 [Beijing: National Defense University Press], 2002, p. 384, and Yu Jixun, 2004, p. 297.

87 See Bi Xinglin, 2002, and Zhang Yuliang, 2006, p. 617.

88 According to *Science of Second Artillery Campaigns*, "because the nuclear forces of the Second Artillery are China's main nuclear forces, the joint nuclear counterattack campaign usually takes the nuclear forces of the Second Artillery as the main component, with the nuclear forces of the navy's nuclear submarines and the nuclear forces of the air force's bomber units unifying the three dimensions of nuclear counterattack operational activities" (Yu Jixun, 2004, p. 297).

89 Bi Xinglin, 2002, pp. 384–385. This tracks very closely with the discussion of the mission of the nuclear counterattack campaign that appears in *Science of Second Artillery Campaigns* (Yu Jixun, 2004, p. 298).

90 See, for example, Bi Xinglin, 2002, pp. 385–386.

91 Yu Jixun, 2004, p. 298.

mand centers, missile bases, and warhead storage facilities, creating hazardous conditions under which the surviving Rocket Force elements would have to conduct nuclear counterattack campaign operations.[92] Consequently, the requirements for protecting the missile force are very demanding.[93] The huge destructive potential of nuclear weapons necessitates highly centralized command and control and attendant communications and command systems that are "resistant to interference and destruction."[94]

The guiding principles [指导思想] for Second Artillery nuclear counterattack campaigns are "close protection and key point counterattacks" [*yanmi fanghu, zhongdian fanji*].[95] "Close protection" concerns the survivability of the missile force and is therefore a vital prerequisite for successfully carrying out a nuclear counterattack campaign.[96] "Key-point counterattacks" involve conducting "nuclear firepower key-point strikes on the enemy's crucial targets," with the objectives being "to cause huge losses for the enemy, and to cause the enemy to be seriously shaken psychologically, to achieve the goal of weakening the enemy's will to wage war."[97]

Finally, PLA publications also discuss some of the main operational activities that would take place as part of a nuclear counterattack campaign. These include initial nuclear strikes, follow-on nuclear strikes, campaign firepower maneuver, battle damage assessment, "handling special situations," and concluding the campaign.[98] Because the campaign could include follow-on nuclear attacks, China must hold some portion of its nuclear weapons in reserve after an initial nuclear exchange, so that it can deter further escalation or launch follow-on strikes if required. Chinese strategists indicate that the Second Artillery should be capable of "carrying out a number of waves of nuclear missile strikes after the initial nuclear strike." Follow-on strikes could consist of repeat strikes against targets that were not destroyed by the initial nuclear strike or

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92 Yu Jixun, 2004, pp. 298–299.

93 Methods of protection listed in *Science of Second Artillery Campaigns* (Yu Jixun, 2004) include improving early warning systems; ensuring appropriate dispersal of positions; hardening missile silos, storage facilities, and command centers; employing air defense, ground defense, and electronic warfare capabilities; and emphasizing concealment and camouflage to hide the activities of missile force units.

94 Little information is provided in most of these sources about what would happen in the event that missile force units were unable to communicate with higher headquarters or with the Supreme Command, but *Science of Second Artillery Campaigns* states that "When command is disrupted or when the situation is urgent, the Second Artillery campaign commanders and their command offices should, within their limited scope of authority, act on their own judgment, in light of the strategic intentions of headquarters" (Yu Jixun, 2004, p. 300).

95 See Bi Xinglin, 2002, pp. 386–387.

96 According to *Science of Second Artillery Campaigns* (Yu Jixun, 2004, p. 303), "close protection" is "the fundamental channel through which the Second Artillery increases survivability and the effective preservation of nuclear counterattack strength under nuclear conditions." The purpose of "close protection" is "to avoid or to the greatest extent possible reduce the losses caused by an enemy nuclear raid or precision strike."

97 Yu Jixun, 2004, p. 304.

98 Yu Jixun, 2004, pp. 306–316.

could be carried out "to maintain a huge amount of pressure and psychological fear against the enemy."[99]

Future Evolution

Fundamental elements of Chinese thinking on the function, strategy, and operations of nuclear weapons have remained unchanged since China first tested a nuclear weapon in 1964 and affirmed its no-first-use policy. Going forward, China is unlikely to change the formal policies or principles associated with its nuclear forces and strategy, given that the logic behind them still holds and that the state would pay a high political price for departing from these principles. Maintaining a limited but credible nuclear deterrent to discourage nuclear attack and prevent nuclear coercion remains the core of Chinese nuclear policy.

But as this chapter suggests, and as the subsequent chapters in this report address in more detail, many Chinese concepts are elastic and may be subject to significant reinterpretation. Even with modest reinterpretation, they may be compatible with important changes to force structure and operational practice—including some with implications for arms race and crisis stability and U.S. extended deterrence. Changes to China's external security environment; shifts in other states' nuclear policies; technological advances by the PLA and the Rocket Force; and the evolution of Chinese bureaucratic structures, procedures, and politics all have the capacity to elicit changes in Chinese strategic thought or practice.

While there will be those in the Chinese strategic community who have pushed—and will likely continue to push—for discipline in maintaining the original intent behind the strategic concepts outlined earlier, virtually all elements of Chinese thinking are open to a degree of reinterpretation. The lean-and-effective standard of nuclear sufficiency, based as it was originally on an existential view of the power of nuclear weapons, may never have been quantified. Even without reinterpretation, this standard could support the continued expansion and diversification of China's nuclear inventory as the perceived threat evolves—and the perceived threat may itself be subject to widely divergent interpretation. As Chapter Three will address, China has undertaken an incremental but nonetheless sustained nuclear modernization program over the past two decades, and the pace of modernization appears to have accelerated in recent years. Thus, while China adheres to the lean-and-effective terminology, questions over what constitutes the boundaries of "lean" and "effective" begin to take on added relevancy.

Similarly, although the no-first-use policy will very likely remain the bedrock of Chinese nuclear policy going forward, it too could potentially be open to reinterpretation. There have been discussions at the elite level about whether attacks on

[99] Yu Jixun, 2004, pp. 306–307.

Chinese nuclear forces and infrastructure would constitute a first strike—and thus trigger Chinese nuclear retaliation. Some Chinese nuclear strategists have also argued that nuclear weapons can help deter conventional strikes against important nonnuclear strategic targets in China. Nuclear threats may come into play in the event of extremely serious "threats to national unity, sovereignty, and territorial integrity."[100] Such internal discussions highlight uncertainties over the nuclear threshold should China find itself in a major conflict, with all the attendant chaos and uncertainty.

The evolution of Chinese nuclear practice could come about in several different ways. As suggested above, new challenges, considerations, or confidence could lead to a leadership-directed or top-down reevaluation or reinterpretation of policy. The development of new capabilities or technologies could also drive changes in practice. For example, the acquisition of technical or procedural capabilities important to some form of limited warfighting capability could lead Chinese planners to consider adjustments to policy that would capitalize on such potential. Some new capabilities could come from China's conventional missile forces, and some could come as a result of simple bureaucratic inertia in China's research and development system. Finally, external and internal drivers could work together if, for example, China felt challenged by the development of nuclear warfighting capabilities in India and therefore decided to accelerate some of its own programs.

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[100] Zhao Xijun, 2005, pp. 41–42.

CHAPTER THREE

China's Nuclear Force Structure

China's nuclear deterrent, once highly vulnerable to a disarming first strike, has been made far less so by the addition of road-mobile systems, new SSBNs, and qualitative improvements to the force. This chapter provides a brief overview of the historical and current evolution of Chinese nuclear forces, providing context for the subsequent discussion of how external and internal forces might either reinforce or deflect the current trajectory of these forces. It focuses on the current size and nature of Chinese nuclear forces and on programs that are thought to be currently in development. It also includes some brief historical background on the evolution of China's nuclear deterrent, offers an overview of China's current nuclear force structure, and highlights some systems that China may deploy in the future.

To date, improvements to Chinese nuclear forces have been broadly consistent both with a desire to maintain an assured retaliatory capability and with a no-first-use doctrine, although recent developments will provide China with other possible employment strategies. China is enhancing the striking power and survivability of its theater and strategic missile forces and improving their ability to counter missile defense developments.[1] For theater nuclear deterrence missions, China currently maintains DF-21 and DF-21A medium-range ballistic missiles (MRBMs) and two classes of intermediate-range ballistic missiles (IRBMs), the aging DF-3 and the newly revealed, and highly accurate, DF-26. China's nuclear ICBM force consists of limited-range DF-4s, silo-based DF-5As and DF-5Bs, and road-mobile DF-31s and DF-31As. Beijing is also moving toward a sea-based nuclear deterrent capability based on the *Jin*-class (Type 094) SSBN and the JL-2 SLBM. Scholars and analysts estimate that, as of early 2016, China's nuclear stockpile includes roughly 260 nuclear warheads, of which about 134 could be mounted on existing ICBMs and SLBMs.[2]

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[1] Michael S. Chase, Andrew Erickson, and Chris Yeaw, "Chinese Theater and Strategic Missile Force Modernization and its Implications for the United States," *Journal of Strategic Studies* Vol. 32, No. 1, 2009, pp. 67–114. We argued that the principal drivers of these developments are China's assessment of its changing external security environment, especially vis-à-vis the United States, and its growing concerns about the viability of its traditional deterrent posture, particularly in a missile defense environment.

[2] For the warhead number, see Kristensen and Norris, 2016c, p. 205.

Looking to the immediate future, China will almost certainly continue to develop its nuclear capabilities. The DF-5B, which made its debut during China's August 2015 victory parade, is the first Chinese missile said to be equipped with MIRVs. But others are likely to follow, and that could result in a rapid increase in the number of strategically deliverable warheads. China appears to be planning a follow-on SSBN and SLBM to enhance the sea-based component and appears to be conducting research on hypersonic glide vehicles (HGVs) to counter missile defenses.[3] With a variety of new systems having matured and the MIRVing of DF-5s, the growth of China's inventory has accelerated, even as quality has improved, and growth (at least in strategically deliverable warheads) is likely to keep accelerating at least through 2025. Nevertheless, barring a more significant shift in military priorities and a willingness to confront the United States more directly, at potential political and economic cost, China will almost certainly not seek or achieve parity with the United States or Russia.

Historical Background

China successfully conducted its first nuclear weapon test on October 16, 1964, and established PLASAF to operate its nuclear ballistic missiles in 1966. That year, China's DF-2 MRBM, which had a range of about 1,000 km and was developed from technology from the Soviet Union, reached initial operational capability. China conducted its first thermonuclear test in 1967. But until the early 1970s, China's nuclear force was still of questionable utility as a strategic deterrent. The DF-2 missile had several shortcomings, including its dependence on a nonstorable liquid propellant. A 1974 U.S. intelligence estimate described it as "an obsolescent and cumbersome missile system with slow reaction times."[4] U.S. analysts estimated that China had deployed only a small number of DF-2s, that production had ceased by 1971, and that the missile was retired from service in 1979.[5]

When China's DF-3 IRBM became operational in May 1971, it reflected important progress in China's ballistic missile programs and bolstered the PRC's limited strategic deterrent capabilities.[6] With a longer range and a storable propellant, U.S. analysts noted that the DF-3 was "superior to the CSS-1 [DF-2] in range and reaction time," but it still had poor accuracy. At the time, China was working on two new liquid-fueled ICBMs—one with a range sufficient to reach Soviet targets east of the Urals

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3 See Zachary Keck, "China Confirms Hypersonic Missile Test," *The Diplomat*, January 17, 2014.

4 See Director of Central Intelligence, *China's Strategic Attack Programs*, National Intelligence Estimate 13-8-74, June 13, 1974, p. 13.

5 John Wilson Lewis and Hua Di, "China's Ballistic Missile Programs: Technologies, Strategies, Goals," *International Security*, Vol. 17, No. 2, 1992, pp. 5–40.

6 Lewis and Hua, 1992.

and some U.S. bases in Asia—and had "a large and ambitious program underway for the development and production of strategic missiles using solid propellants."[7] Beijing also showed interest in SSBNs and trained bomber crews to conduct nuclear missions, although its bombers were highly vulnerable to modern air defense systems. By mid-1971, China had conducted 11 nuclear tests.

By the mid-1970s, China was capable of conducting nuclear strikes against targets along its periphery, including targets in the Soviet Union and U.S. bases in Asia.[8] China's DF-4 limited-range ICBM achieved initial operational capability in late 1975. The two-stage, silo-based missile was the first China deployed that was capable of reaching Moscow. With a small nuclear force, however, Chinese leaders recognized that survivability was "crucial to the effectiveness of their nuclear deterrent," according to a 1974 National Intelligence Estimate (NIE) on China's strategic weapons programs.[9]

In the early 1980s, China achieved several major milestones in developing its nuclear capabilities. May 1980 saw China's first full-range flight tests of the DF-5 ICBM into the Pacific Ocean. The following year, the DF-5 ICBM reached operational status, giving China a nuclear missile system capable of reaching targets in the continental United States.[10] China conducted its first successful JL-1 SLBM flight test in October 1982, marking an important achievement in the development of solid-propellant ballistic missiles.[11] The road-mobile solid-fueled DF-21 MRBM was first successfully flight-tested in May 1985, giving China a more responsive capability against regional targets. In addition, China began research and development on its second generation of strategic ballistic missiles, the JL-2 SLBM and the DF-31 road-mobile ICBM.

Although China enjoyed positive relations and strategic cooperation with the United States in the 1980s, and Beijing saw the threat of Soviet attack as diminishing, technological developments threatened to complicate China's approach to nuclear deterrence. Most importantly, China's concerns about U.S. plans to deploy a strategic missile defense system underscored Beijing's anxiety that even a relatively limited missile defense capability could undermine its modest nuclear deterrent.[12] Nonetheless, China's nuclear deterrent capabilities remained limited throughout the 1990s.

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7 Director of Central Intelligence, *Communist China's Weapons Program for Strategic Attack*, National Intelligence Estimate 13-8-71, October 28, 1971, p. 4.

8 Director of Central Intelligence, 1974, pp. 27–30.

9 Director of Central Intelligence, *PRC Defense Policy and Armed Forces*, National Intelligence Estimate 13-76, November 11, 1976, p. 47. Note that Lewis and Xue state the DF-4 was not deployed until 1980.

10 Lewis and Hua, 1992.

11 Lewis and Xue, 1993.

12 See Brad Roberts, *China and Missile Defense: 1955 to 2002 and Beyond*, Alexandria, Va.: Institute for Defense Analysis, P-3826, September 2003, and Mark A. Stokes, "Chinese Ballistic Missile Forces in the Age of Global Missile Defense: Challenges and Responses," in Andrew Scobell and Larry M. Wortzel, eds., *China's Growing*

China's Current Nuclear Force Structure

Since the 1990s, China's nuclear posture has continued evolving.[13] Today, China's nuclear force consists of MRBMs and IRBMs for regional deterrence missions, silo-based ICBMs, road-mobile ICBMs, and an emerging SSBN and SLBM capability.

Nuclear MRBMs and IRBMs

China's nuclear-armed MRBMs and IRBMs now hold U.S. forces in Asia—and U.S. allies, should they facilitate such an attack—hostage in the event of nuclear attack against China. They also serve to deter nuclear attack by smaller powers, most prominently India, and as a hedge against renewed tensions with Russia or a falling out with North Korea. China currently deploys DF-21 and DF-21A MRBMs and DF-3 and DF-26 IRBMs for regional nuclear deterrence missions.[14] The DF-3, first deployed in 1971, is a single-stage liquid propellant IRBM with a maximum range of about 3,000 km (1,900 mi). NASIC suggests that the DF-3 is transportable but has "limited mobility."[15] China still has about five to ten DF-3 launchers, according to the 2013 NASIC report.[16] Many observers expect that China's 1970s vintage DF-3 IRBMs will likely be retired from service in the near future.[17] China has been transitioning to a more survivable, road-mobile theater nuclear force for many years. This force currently consists of DF-21 and DF-21A MRBMs and the DF-26 IRBM. The DF-21 and DF-21A are both two-stage solid propellant road-mobile missiles with maximum ranges of more than 1,750 km (more than 1,100 mi).[18] According to the 2013 NASIC report on ballistic and cruise missile developments, China deploys fewer than 100 launchers for these nuclear-armed MRBMs.[19] In August 2015, China revealed a new road-mobile IRBM, the DF-26, with an estimated range of 3,000 to 4,000 km. Like the DF-21, both conventional and nuclear variants will be deployed.

Military Power: Perspectives on Security, Ballistic Missiles, and Conventional Capabilities, Carlisle, Pa.: Strategic Studies Institute, U.S. Army War College, 2002.

13 Brad Roberts, "Strategic Deterrence Beyond Taiwan," in Roy Kamphausen, David Lai, and Andrew Scobell, eds., *Beyond the Strait: PLA Missions Other Than Taiwan*, Carlisle, Pa.: Strategic Studies Institute, U.S. Army War College, 2008.

14 NASIC, *Ballistic and Cruise Missile Threat*, Wright-Patterson Air Force Base, Ohio, NASIC-1301-0985-09, 2009, p. 14.

15 NASIC, 2013, p. 17.

16 NASIC, 2013, p. 17.

17 OSD, *Annual Report to Congress: The Military Power of the People's Republic of China, 2009*, Washington, D.C.: U.S. Department of Defense, 2009, p. 24.

18 NASIC, 2009, p. 17.

19 NASIC, 2013, p. 17.

Silo-Based Intercontinental Ballistic Missiles

The silo-based DF-5 ICBM, a liquid-propellant, two-stage missile, served as the mainstay of China's intercontinental nuclear deterrence force for more than two decades after its initial deployment in 1981, and it remains an important component of that force today. China currently deploys about 20 of these missiles, which have a range of at least 13,000 km (more than 8,000 mi), sufficient to strike targets throughout the continental United States.[20] A variant, marked DF-5B, participated in the August 2015 victory parade, and the Chinese commentators announced that these carry MIRVs—the first time that MIRVs have been deployed on Chinese missiles. The development has long been anticipated in U.S. government sources.[21] The PRC also still fields some of its older and relatively limited-range, liquid-fueled DF-4 ICBMs, which are two-stage liquid propellant missiles with a range of about 5,400 km (more than 3,400 mi). According to NASIC, China still has about ten to 15 launchers, but many observers anticipate that China will soon decommission this older system.[22]

Road-Mobile Intercontinental Ballistic Missiles

Small numbers of silo-based missiles (such as China's DF-4s and DF-5s) are inherently vulnerable against greatly superior attacking forces, and China sought to mitigate vulnerability by developing and deploying mobile systems. After development programs that lasted many years, China has fielded two road-mobile ICBMs, the DF-31 and DF-31A. The DF-31 is a three-stage, solid-propellant, road-mobile ICBM with a maximum range of more than 7,200 km (more than 4,500 mi). It is likely intended mainly to cover targets in Russia and Asia, but the missile's range is sufficient to reach U.S. missile defense sites in Alaska, U.S. forces in the Pacific, and targets in parts of the western United States.[23] The system, first flight tested in 1999, was deployed in 2006.[24] The DF-31A is a three-stage road-mobile ICBM with a maximum range of more than 11,200 km (more than 7,000 mi). Deployed in 2007, its longer range allows it to reach targets throughout most of the continental United States. Hans Kristensen and Robert Norris estimate that, by 2016, China had deployed between 20 and 45 road-mobile ICBM launchers, which is roughly consistent with the 2013 NASIC's unclassified report on ballistic and cruise missile threats.[25]

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[20] NASIC, 2009, p. 21.

[21] See, for example, OSD, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2014*, Washington, D.C.: U.S. Department of Defense, 2014a, p. 7.

[22] NASIC, 2013, p. 21.

[23] Robert D. Walpole, "Ballistic Missile Threat to the United States," statement for the record to the Senate Subcommittee on International Security, Proliferation, and Federal Services, February 9, 2000.

[24] NASIC, 2009, p. 24.

[25] Kristensen and Norris estimate the total number of ICBMs at 50 to 75, and the same source lists an estimated 30 silo-based ICBMs—yielding a range of between 20 and 45 road-mobile systems. NASIC, 2013, p. 21; Kristensen and Norris, 2016c, p. 206.

Ballistic Missile Submarines and Submarine-Launched Ballistic Missiles

Beijing's long-standing pursuit of a sea-based deterrent is also aimed at enhancing the survivability of its nuclear force. Most observers agree that the only operational first-generation *Xia*-class SSBN never conducted a deterrent patrol, but China is finally gaining an operational submarine-based nuclear deterrent capability with the Type-094, or *Jin*-class, SSBN and the JL-2 SLBM.

Nuclear Warheads

In 2012, Hui Zhang, a researcher at Harvard University's Belfer Center for Science and International Affairs, estimated that China's nuclear arsenal consists of about 170 nuclear weapons.[26] More recently, Kristensen and Norris, writing in the *Bulletin of the Atomic Scientists*, have estimated that China probably has about 260 nuclear warheads.[27] These assessments are broadly consistent with publicly available information about Chinese fissile material production (see Chapter Eight) and with declassified U.S. intelligence reports.[28] Significantly higher figures have occasionally been proffered, but none based on credible evidence.[29] Assessments by nongovernmental experts conclude that the warheads carried by China's older missile systems are multimegaton warheads, whereas they judge that those deployed on its more modern road-mobile ICBMs have yields of several hundred kilotons.[30]

Evolution of China's Nuclear Capability to Date

China's nuclear forces have remained modest in size since their establishment in the 1960s, but they have matured in terms of survivability and retaliatory capability, especially since the mid-1990s. In 1996, China deployed roughly 100 nuclear-capable missile systems—all were of limited, if any, mobility; all but the handful of DF-5s had limited range; and all but the JL-1 were liquid fueled (see Table 3.1). By 2016, China deployed more than 200 nuclear-capable missile systems, including roughly 100 that

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[26] Hui Zhang, "China's Nuclear Weapons Modernization: Intentions, Drivers, and Trends," presented at the Institute for Nuclear Materials Management 53rd Annual Meeting, Orlando, Fla., July 15, 2012.

[27] Kristensen and Norris, 2016c.

[28] See, for example, Central Intelligence Agency, Directorate of Intelligence, *Proliferation Digest*, March 1996.

[29] Based largely on the scale of China's military tunnel complex and on internet reports that have subsequently been discredited, Phillip A. Karber claims that the Chinese may have as many as 3,000 warheads. See Phillip A. Karber, "Arms Control Implications of China's Underground Great Wall," briefing, September 26, 2011, and William Wan, "Georgetown Students Shed Light on China's Tunnel System for Nuclear Weapons," *Washington Post*, November 29, 2011. For persuasive technical rebuttals that focus largely on the limits of China's weapon-grade fissile material and on dubious sources used in the Karber analysis, see Jeffrey Lewis, "Say It Ain't So, Phil," *Foreign Policy*, February 19, 2015, and Nuclear Threat Initiative, "Analysts Question Research on China's Nuclear Arms," webpage, December 2, 2011

[30] See, for example, Shannon N. Kile, Philip Schell, and Hans M. Kristensen, "Chinese Nuclear Forces," in *SIPRI Yearbook 2012, Armaments, Disarmament and International Security*, Stockholm: Stockholm International Peace Research Institute, 2012, pp. 327–331.

could reach parts of the United States from potential firing positions in China or the maritime domain.[31] More important, China's nuclear forces were far more capable and included road-mobile systems, modern (if still somewhat noisy) SSBNs, a limited number of MIRVed missiles, and a far larger number of solid-fueled systems.

Future Land- and Sea-Based Missile Systems

China's Strategic Missile Force Encyclopedia highlights a number of modernization goals. It indicates that China's "strategic missile force building policy" [*zhanlüe daodan budui jianshe fangzhen*] is based on guidance from Mao Zedong, Deng Xiaoping, Jiang Zemin, and Hu Jintao. According to the encyclopedia, the following are the specific guidelines for modernization:

- Use new era military strategic principles as guidance.
- Use information technology development as the core of construction.
- Focus on building quality.
- Improve overall combat capability (including survivability, rapid-response capability, command ability, penetration and defense abilities, attack capability, and support capabilities).
- Concentrate on strategic task requirements based on national and military conditions (including economic affordability).[32]

The 2013 *Science of Military Strategy* highlights increasing the number of ICBMs, improving survivability, and enhancing the ability to penetrate enemy missile defenses as important means of strengthening China's nuclear counterattack capability.[33]

As China continues to modernize its nuclear force structure in line with this general guidance, many analysts expect it to deploy more modern and survivable systems. In February 2017, the Chinese Ministry of Defense acknowledged the test of a new strategic missile variant, the DF-5C, and cited Western reports that it might carry as many as ten MIRVs.[34] According to DoD, China is developing a new road-mobile ICBM, the DF-41, capable of carrying MIRVs.[35] Although China has not officially

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[31] The latter number of strategic delivery systems includes the JL-2 SLBM and DF-5 and DF-31 variants. The 2016 DoD report on Chinese military power stipulates that "China's nuclear arsenal currently consists of approximately 75–100 [land-based] ICBMs," a number which the report says includes the DF-4 (OSD, 2016, p. 58).

[32] *China Strategic Missile Force Encyclopedia*, 2012, p. 67.

[33] Shou Xiaosong, 2013, pp. 233–234.

[34] Ministry of National Defense, "China Says Its Trial Launch of DF-5C Missile Normal," press release, February 6, 2017.

[35] OSD, 2016, p. 25.

Table 3.1
Estimated Chinese Nuclear Delivery Inventory, 1996–2026

	Range (km)	Year Deployed	1996		2006		2016		2026 (low)		2026 (high)	
			Missiles	Warheads	Missiles	Warheads	Missiles	Warheads	Missiles	Warheads	Missiles	Warheads
Missiles												
ICBMs												
DF-4 (CSS-3)	≥5,500	1980	20	20	20	20	10	10	—	—	—	—
DF-5A (CSS-4 Mod 2)	≥13,000	1981	7	7	20	20	10	10	10	10	—	—
DF-5B (CSS-4 Mod 3)	≥13,000	2015	—	—	—	—	10	30	10	30	20	60
DF-31 (CSS-10 Mod 1)	≥7,000	2006	—	—	6	6	12	12	12	12	12	12
DF-31A (CSS-10 Mod 2)	≥11,000	2007	—	—	—	—	24	24	24	24	24	24
DF-41 CSS-X-20	≥12,000		—	—	—	—	—	—	12	36	24	96
SLBMs												
JL-1	≥1,000	1986	12	12	12	12	—	—	—	—	—	—
JL-2	≥7,000	2015		—	—	—	48	48	60	60	60	60
JL-3				—	—	—	—	—	—	—	?	?
Theater ballistic missile (TBM) launchers (MRBMs and IRBMs)												
DF-3A (CSS-2)	3,000	1971	40	40	20	20	?	?	—	—		—

Table 3.1—Continued

	Range (km)	Year Deployed	1996		2006		2016		2026 (low)		2026 (high)	
			Missiles	Warheads	Missiles	Warheads	Missiles	Warheads	Missiles	Warheads	Missiles	Warheads
DF-21A (CSS-5 Mod 1, 2)	2,150	1991	20	20	33	33	80	80	80	80	100	100
DF-26	3,500	2015	—	—	—	—	8	8	20	20	30	30
HGVs												
HGV-X	Unknown		—	—	—	—	—	—	—	—	6	6

SOURCES: NASIC, 2009; NASIC, 2013; International Institute for Strategic Studies (IISS), *The Military Balance*, 1997, 2007, and 2016; OSD, 2016; Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2015," *Bulletin of the Atomic Scientists*, Vol. 71, No. 4, July 1, 2015a, pp. 77–84.

NOTES: For theater missiles, the number of launchers is indicated. Some of these launchers may have associated reloads, so the actual number of missiles may be somewhat higher. The table includes only missiles and missile variants that are thought to be armed with nuclear warheads; it therefore excludes, for example, the DF-21C, which is armed with conventional warheads, and the DF-21D antiship ballistic missile. OSD, 2016, provides a larger total number of land-based ICBMs (75–100).

acknowledged the DF-41, the Chinese media reported widely on Western accounts of a second test launch of a DF-41 (armed in this case with two dummy warheads) in April 2016. The Chinese Defense Ministry, also citing Western reports, posted a message on its website: "These tests are not aimed at any set country or target."[36] The 2016 DoD report on Chinese military developments notes that

> China insists the new generation of mobile missiles, with warheads consisting of independently targeted reentry vehicles (MIRVs) and penetration aids, are intended to ensure the viability of China's strategic deterrent in the face of continued advances in U.S. and, to a lesser extent, Russian strategic ISR, precision strike, and missile defense capabilities.[37]

China also reportedly plans to further strengthen the sea-based component of its nuclear deterrent with the development of the Type 096 SSBN and JL-3 SLBM.[38] In addition, China is developing HGVs. These systems can be boosted on a traditional missile and use aerodynamic lift in the upper atmosphere, extending their range. Most important for China, HGVs have the capability to maneuver and could therefore improve China's ability to counter enemy missile defense systems.[39] As of January 2017, China had conducted seven flight tests of an HGV that DoD has labeled the DF-ZF.

Conclusions

China's nuclear forces have evolved rapidly in recent years, with gains to survivability, mobility, speed of preparation, and accuracy. The number of strategic weapons capable of reaching the United States has also grown, and the rate of growth has accelerated over the last 20 years as new systems have come online. Based on programs currently thought to be ongoing, at least some of which will include MIRVed warheads, growth is likely to continue increasing at least into the 2020s. Given the long lead times that many nuclear programs require, we are unlikely to see dramatic changes in the number

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[36] "International Security: China Confirms Further Test of Long-Range Missile DF-41," *Sydney Morning Herald*, April 22, 2016. The initial Western report on the test was carried in the *Washington Free Beacon* and quoted unnamed Pentagon officials (Bill Gertz, "China Flight Tests New Multiple-Warhead Missile: DF-41 Launch Comes Amid Heightened Tensions over S. China Sea," *Washington Free Beacon*, April 19, 2016).

[37] OSD, 2016, p. 57.

[38] For Chinese press reports on these systems, see, for example, 〈专家：中国或加快潜艇建造新一代核潜艇将具交强威慑〉 ["Specialist: China May Speed Construction of A New Generation of Nuclear Submarine to Strengthen Deterrence"], *Renmin Wang*, September 2, 2016, and 〈中国首次具备对美国有效的水下战略核威慑〉 ["For the First Time, China Prepares an Undersea Strategic Nuclear Deterrent Effective Against the United States"], 环球网 [Huanqiu net], October 29, 2013.

[39] OSD, 2016, p. 22; Lee Fuell, "Broad Trends in Chinese Air Force and Missile Modernization," testimony before the U.S. -China Economic and Security Review Commission, January 30, 2014.

and types of Chinese-deployed nuclear systems beyond those discussed above during the period considered. And China is not likely to reach parity with the United States and Russia over the next ten to 15 years. However, it is possible that changes in China's external environment, its threat perceptions, or bureaucratic and technological factors could produce additional adjustments to Chinese nuclear programs, policy, or practice. Even if such changes would not be fully reflected in deployed forces in the next ten years, they could be within 15. We now turn to China's perception of its external security environment and its potential evolution over the coming decade.

CHAPTER FOUR

China's View of the Global Security Environment

China's view of its external security environment and the nuclear programs and strategies pursued by neighboring states and potential adversaries have decisively shaped China's nuclear doctrine and strategy. Beginning in 1964 with China's first test of a nuclear weapon, Chinese leaders declared that its nuclear program was a reaction to "nuclear blackmail" by "hegemonic powers," meaning the Soviet Union and the United States. In this chapter, as well as the following two chapters, we examine China's views of its changing external security environment and how its threat perception might shape or drive continuity or change in its nuclear force structure, policy, or posture. This chapter examines China's view of the global security environment, providing context for its assessment of nuclear issues. Chapter Five examines China's evolving view of U.S. strategic forces and policy, the most important planning factors for China today. Finally, Chapter Six examines Chinese perspectives on other nuclear powers and the possibility that regional nested security dilemmas and the resulting development of second-tier nuclear forces could become more significant drivers for Chinese nuclear forces and planning in future years.

Overall Security Environment

Official Chinese government assessments of China's security environment, as communicated through major policy documents, provide the basis on which Chinese strategists fashion foreign and defense policy. Defense white papers and other authoritative assessments signal to analysts the consensus among China's top policymakers about the trajectory of security trends around China's periphery. These documents also offer an important analytical framework for understanding the priorities and concerns that might influence future changes to China's foreign policy and defense posture.

Chinese strategic statements adopt a dualistic view of the external security environment. On the one hand, Beijing sees its future as inextricably linked to the international community and perceives the overall security environment as peaceful and stable. Chinese leaders understand that China's current growth model, combined with the acceleration of globalization, is intertwined with the international environment.

Thus, China's success in accomplishing national revitalization relies on close and continuing interaction with global and regional powers, markets, and institutions. China's 2010 national defense white paper states succinctly, "[China's] future and destiny has never been more closely connected with those of the international community."[1] In assessing the overall security environment, China's 2015 defense white paper notes, "Peace, development, cooperation and mutual benefit have become an irresistible tide of the times." Its 2013 defense white paper struck a similar tone, concluding that peace and development were the "underlying trends" in the strategic environment and noting that the "balance of international forces" was "shifting in favor of maintaining world peace."[2]

On the other hand, Chinese policymakers see a range of increasingly severe threats to China and are increasingly willing to acknowledge such concerns in major policy documents. These threats include transnational terrorism, the diffusion of sophisticated military and cyber technologies, and what Beijing regards as the strengthening of U.S.-led alliance relationships along China's periphery that aim to threaten or otherwise constrain Chinese national and territorial interests in the region.[3] The tensions between these two views are reflected not only in official Chinese security assessments but also in semiauthoritative Chinese think-tank and university studies funded by the central government.[4] While the Chinese government's current position is that, on balance, China faces a favorable external security environment for continued growth and development, the propensity of Chinese forecasters to increasingly highlight the threats to China's national interests illustrates a level of unease and concern about the future trajectory of China's external security environment higher than at any time since at least the immediate post-Tiananmen period.

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1 State Council Information Office, 2011.

2 State Council Information Office, 2015; State Council Information Office, 2013.

3 Recent authoritative publications, including China's 2015 and 2013 defense white papers, its *Blue Book on National Security*, and *Science of Military Strategy* all conclude that containment, hegemonism, and "cold war" policies are on the rise, threatening China's long-term economic and security development. These publications include State Council Information Office, 2015; State Council Information Office, 2013; 〈中国国家安全研究报告2014〉 ["Annual Report on China's National Security Studies 2014"], 《国家安全蓝皮书》 [*Blue Book on National Security*], Beijing: Social Sciences Academic Press, 2014; and Shou Xiaosong, 2013, pp. 170–171.

4 These studies include Zhang Youwen and Huang Renwei, eds., 《中国国际地位报告》 [*China's International Status 2013*], Beijing: People's Press, 2013; PRC National Defense University Center for Strategy, eds., 《国际战略形势与中国国家安全》 [*International Strategic Environment and Chinese National Security*], Beijing: Eastern Press, 2016; 国家海洋局海洋发展战略研究所 [State Oceanic Administration, Ocean Development Research Department], 《中国海洋发展报告(2013)》 [*China's Ocean Development Report (2013)*], Beijing: State Oceanic Administration Press, 2014; and Li Xiangyang, ed., 《亚太地区发展报告 (2015)》 [*Annual Report on the Development of Asia-Pacific (2015)*], Beijing: Social Sciences Academic Press (China), 2015.

Low Likelihood of Major Power Conflict

An enduring feature of Chinese assessments of the external environment is a belief in the low probability of war among major powers. As the 2010 defense white paper states, "coordination and cooperation have become mainstream in relationships among the world's major powers."[5] This view has roots in Deng Xiaoping's seminal statement in 1985 that "peace and development are the main trends of the times" [*heping yu fazhan shi dangjin shidai de zhuti*] and reflects an understanding that the broad contours of major power relations have changed since the height of the Cold War, lessening the imminence of armed conflicts among major powers and overturning Mao's assessment of the likelihood of "early war, major war, and nuclear war" [*zao da, da da, he zhanzheng*].[6]

Jiang Zemin's assessment in 2002 that the next 20 years represented a "period of strategic opportunity" [*zhanlue jiyuqi*] for China's growth and development further justifies and validates this assessment that the current international environment remains sufficiently peaceful to allow the continuation of reform-era foreign policies focused on promoting China's stability and economic development.[7] More recently, in a key foreign policy speech in November 2014, Xi Jinping reaffirmed that China remains in, and should seek to support and maintain, the "period of strategic opportunity" outlined by Jiang Zemin.[8]

Threats Remain, Asia-Pacific Region Less "Stable"

The low probability of war among major powers is balanced by persistent Chinese concerns about multiple and growing threats to Chinese, Asian, and global stability. The 2013 defense white paper provides a comprehensive Chinese assessment of such concerns:

> There are signs of increasing hegemonism, power politics and neointerventionism. Local turmoils occur frequently. Hot-spot issues keep cropping up. Traditional

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5 State Council Information Office, 2011.

6 See, for example, 宫力 [Gong Li], ‹邓小平对美政策思想与中美关系› ["Deng Xiaoping's Thoughts on U.S. Policy and Sino-U.S. Relations"], «国际问题研究» [*China International Studies*], Vol. 6, 2004. See also Zhang Wankun Franklin, *China's Foreign Relations Strategies Under Mao and Deng: A Systematic Comparative Analysis*, Hong Kong: City University of Hong Kong, 1998.

7 Jiang Zemin, "Build a Well-Off Society in an All-Round Way and Create a New Situation in Building Socialism with Chinese Characteristics," report at the 16th National Congress of the Communist Party of China, November 8, 2002.

8 耿聪 [Geng Cong], ‹习近平在中央外事工作会议发表重要讲话强调高举和平, 发展, 合作, 供应旗帜› ["In an Important Speech to the Central Foreign Affairs Work Conference, Xi Jinping Emphasizes Holding Aloft the Banner of Peace, Development, Cooperation, and Win-Win"], *People's Daily*, November 29, 2014, p. 1.

> and nontraditional security challenges interweave and interact. Competition is intensifying in the international military field.[9]

A 2016 report from the Chinese National Defense University goes further, arguing that the relationship between major powers appears to be moving from "cooperation being the primary" mode of interaction and "competition as secondary," toward a situation where the two are reversed—with the world sliding toward a situation in which competition is becoming dominant.[10]

China's 2013 defense white paper featured an unusually frank and overall negative assessment of the security situation in the Asia-Pacific. For the first time, Chinese strategists dropped an assessment that the security environment in the Asia-Pacific remained "stable." The authors subsequently singled out the United States and Japan as contributing to instability, noting that "some country" has "strengthened its Asia-Pacific military alliances, expanded its military presence in the region," and "frequently makes the situation there tenser" [*pinfan zhizao diqu jinzhang jushi*].[11] On Japan, the authors accuse the country of "making trouble" [*zhizao shiduan*] over the issue of the Senkaku Islands.[12] This assessment is consistent with other recent Chinese studies on the Asia-Pacific environment, with several singling out Japan's nationalization of the Senkaku Islands and increased patrol activities as key drivers of instability.[13]

Also prominent in these assessments is the notion that China's territorial rights are increasingly being infringed on, with a recent defense white paper noting, "China has an arduous task to safeguard its national unification, territorial integrity, and development interests."[14] China's 2015 defense white paper maintained the same theme, noting that China's territorial sovereignty and maritime rights and interests are increasingly being compromised and that Japanese actions and the U.S. rebalance are growing concerns for China.[15] The fact that these assessments essentially mirror image regional perceptions that China is more often the initiator of challenges to the status quo—or at least responds disproportionately to the activities of others—does not mean that Beijing's beliefs are not sincerely held.

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9 State Council Information Office, 2013.

10 PRC National Defense University Center for Strategy, 2016.

11 State Council Information Office, 2013.

12 State Council Information Office, 2013.

13 See, for example, PRC National Defense University Center for Strategy, eds., 《国际战略形势与中国国家安全》 [*International Strategic Environment and Chinese National Security*], Beijing: Eastern Press, 2012; "Annual Report on China's National Security Studies," 2014; State Oceanic Administration, Ocean Development Research Department, 2014.

14 State Council Information Office, 2013.

15 State Council Information Office, 2015.

China's *Blue Book on National Security* also strikes a pessimistic tone on recent trends around China's periphery, noting the "Cold War thinking" of the United States and Japan in "reinforcing their policy of containment and constraint against China."[16] The authors highlight the "increasingly grave disputes" over maritime sovereignty with neighboring states that are "likely to intensify in scale and complexity."[17] These assessments highlight China's frustration over what it regards as the increasingly antagonistic behavior of other actors around China's periphery, notably Japan and the United States, and of smaller states whose actions over territorial disputes China views as provocative, such as the Philippines and Vietnam—as well as the disconnect between Chinese views and those of many of its neighbors, most of whom view China as the primary culprit.

Chinese Views on Global Nuclear Environment

Chinese perceptions of the international security environment are closely tied to trends in the global nuclear environment. During the Cold War, Chinese analysts saw the nuclear competition between the United States and the Soviet Union as a symbol of the unstable and tense security environment that then characterized international relations. China's generally positive but nevertheless mixed assessment of the global security environment is thus also closely tied to a similar assessment of nuclear trends in the 21st century. Beijing remains concerned about U.S. ballistic missile defense (BMD); the nuclearization of space; the large nuclear arsenals of the United States and Russia; and the developing nuclear capabilities of neighboring nuclear powers, including India, Pakistan, and North Korea.[18] There is little, if any, apparent reflection about China's own role in Pakistan's nuclear program or the consequences of its inaction on North Korea's.

The 2013 version of *Science of Military Strategy* notes that, while Chinese strategists no longer view the current environment as being characterized by nuclear hegemonism and power politics, China nonetheless faces a more "complex" nuclear environment. The authors highlight four general trends:[19]

- the tendency of "major nuclear powers" (a clear reference to the United States) to treat China as its "main strategic opponent" [*zhuyao zhanlve duishou*]
- the growing actual or latent nuclear capabilities of China's neighbors (India, Pakistan, and North Korea)

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16 "Annual Report on China's National Security Studies," 2014, p. 1.

17 "Annual Report on China's National Security Studies," 2014, pp. 1–2.

18 Shou Xiaosong, 2013; *China Strategic Missile Force Encyclopedia*, 2012.

19 Shou Xiaosong, 2013, pp. 170–171.

- the increasing sophistication of some major powers' conventional military capabilities, with the U.S. development of prompt global strike a particular concern, given the potential to target China's nuclear weapons with conventional strikes
- outside pressure [*waibu yali*] for China to participate in arms limitations or reductions while it remains greatly inferior to the United States and Russia in nuclear capabilities.

The *China Strategic Missile Force Encyclopedia* provides another important assessment of Chinese views on the nuclear environment. On the issue of "nuclear development trends," the authors view more countries adopting "dual deterrence strategies" combining nuclear and conventional capabilities. In this construct, the traditional nuclear triad of land-, sea-, and air-based missile forces is replaced with a "four-in-one" structure with space constituting a new strategic component.[20] Furthermore, nuclear forces are becoming more "synthesized, multifunctional, miniaturized, and motorized."[21] And finally, the authors view innovations in the leadership and command structure as reducing "midlevel and segment components."[22]

The authors are wary about trends in nuclear disarmament. They note that progress has been "slow and difficult and may even be reversed" because U.S. missile defenses have "widened the gap between the United States and other midlevel nuclear powers."[23] Missile defense systems, in their view, will "hinder" midlevel nuclear countries from participating in the process of nuclear disarmament, forcing them to "consider enhancing their nuclear forces to counterbalance defense assets."[24] The authors also view the nuclear nonproliferation regime as "shaken" by the nuclear tests of India and Pakistan. Going forward, persuading India and Pakistan to join the NPT will be necessary for the legitimacy of the nonproliferation regime.[25]

Conclusions

Chinese views of the global security environment suggest that, despite important elements of continuity in perspectives on the nature of the international system, challenges are increasing in number and severity. The U.S.-China relationship is, in this view, increasingly adversarial; Japan is showing worrisome signs of militarist revival; and a range of smaller states are challenging Chinese maritime rights. While the pros-

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20 *China Strategic Missile Force Encyclopedia*, 2012, pp. 42–44; 127–128.

21 *China Strategic Missile Force Encyclopedia*, 2012, pp. 127–128.

22 *China Strategic Missile Force Encyclopedia*, 2012, pp. 127–128.

23 *China Strategic Missile Force Encyclopedia*, 2012, pp. 42–44.

24 *China Strategic Missile Force Encyclopedia*, 2012, pp. 42–44.

25 *China Strategic Missile Force Encyclopedia*, 2012, pp. 42–44.

pects for general war may be low, Chinese strategic documents suggest a strong likelihood that more-limited conflicts may occur. We can conclude from this that, even if Chinese economic growth rates decline in the coming years and decades, the demand signal for military resources is unlikely to diminish. Chinese leaders will have to balance military demands with a variety of societal needs. The rate of growth in military budgets may decline, but barring dramatic changes in the domestic or international situation, it is unlikely that growth in the military budget will lag significantly behind economic growth rates.

Within the larger environment of heightened risk, Chinese strategists see a number of specific nuclear challenges, including U.S. development of new offensive and defensive systems, the growth of regional nuclear inventories, and increased pressure for China to participate in nuclear arms control negotiations before its forces have sufficiently matured to guarantee its retaliatory capability. As noted in Chapter Two, China's historically limited view of minimum deterrence has meant that its nuclear forces have not received priority in PLA resource allocation. The transition from the Second Artillery Force to Rocket Force may signal a change in nuclear fortunes. Regardless, a credible nuclear deterrent is viewed as uniquely important to Chinese security. Any sense that U.S. or other countries' capabilities could jeopardize China's secure second-strike capability would almost certainly prompt greater nuclear efforts.

CHAPTER FIVE

Chinese Views of U.S. Nuclear Forces and Policy

Chinese strategic statements, as well as interviews with Chinese experts and policymakers, indicate that the United States and its nuclear forces are, overwhelmingly, the most important planning factor in the design and operation of Chinese nuclear forces.[1] In terms of nuclear capabilities, the United States is rivaled only by Russia, and of the two, only the United States is viewed as a potential adversary in plausible scenarios that could occur in the short- to medium-term future.[2] Although they are clearly not the only drivers of Chinese nuclear development, U.S. nuclear forces and policy will have a larger impact on Chinese nuclear futures than those of any other single foreign power.

Disentangling China's view of U.S. nuclear strategy from its view of U.S. national strategy more broadly is difficult. Chinese analysts tend to view strategic nuclear matters, as they view all military matters, in highly political terms. The view that the United States and China embrace competitive, as well as cooperative, positions on a range of strategic and broader political and economic issues bleeds into China's concerns about its nuclear position vis-à-vis the United States. But the reverse is also true. China's deep suspicions of U.S. nuclear policy, fueled by fears over the implications of BMD and CPGS, feed into growing doubts about U.S. strategic intentions. To be sure, Chinese analysts have welcomed some U.S. adjustments to nuclear policy and programs over the past decade but nevertheless see considerable uncertainty about the implications of other programs for China's retaliatory capability.

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[1] Chinese doctrinal texts note that the United States sees China as its principal threat but are circumspect in saying explicitly that China views the United States its principal threat. Rather, the emphasis is on U.S. systems and strategies that threaten Chinese nuclear posture, thus implying that China views the United States as the only country capable of threatening Chinese second-strike capabilities. Chinese academics, however, are more direct in their analysis that the United States constitutes China's primary nuclear threat. As one academic puts it, "Overall, China's nuclear forces are mainly directed at the United States" (Pei Shen, "China Has Undersea Strategic Nuclear Deterrent Against United States for the First Time," *Global Times Online* [in Chinese], October 30, 2013).

[2] Chapter Six addresses the historical importance of Russia to Chinese nuclear development and Russia's diminished but nevertheless significant role today.

U.S. Nuclear Weapon Doctrine and Strategy

China's perceptions about the U.S. nuclear threat date to the Cold War, when the United States adopted policies that China considered tantamount to "nuclear blackmail and hegemony." Various U.S. officials threatened nuclear use during the Korean War and during the first and second Taiwan Crises (1954–1955 and 1958, respectively).[3] In 1965, shortly after China's first nuclear test, Premier Zhou Enlai pointed out that if China genuinely wanted to put a stop to "nuclear blackmail from external powers," it had to possess its own authentic nuclear deterrence force.[4] This historical narrative of U.S. nuclear threat colors contemporary Chinese assessments of U.S. nuclear strategy.

Post–Cold War shifts in U.S. nuclear policy have heightened Chinese uncertainties. The concept of a "new triad" based on nuclear and nonnuclear weapons, BMD, and revitalized defense infrastructure, revealed in purported leaks of the classified 2002 U.S. NPR, raised the specter that the United States might develop strategies to neutralize a Chinese second-strike capability.[5] Chinese doctrinal texts note that the Bush administration proposed the concept of "preemptive" nuclear strikes and that it reaffirmed the option to use nuclear weapons first if necessary.[6]

Chinese analysts viewed the 2010 NPR and 2013 *Report on the Nuclear Employment Strategy of the United States* more positively, seeing them as steps toward building greater confidence in U.S. intentions.[7] Both documents stipulated that the "fundamental role" of U.S. nuclear weapons is to deter nuclear attack, reaffirmed that the U.S. will not carry out or threaten a nuclear attack against nonnuclear-weapon states that are in compliance with their obligations under the NPT, and proposed efforts to reduce the U.S. nuclear weapons stockpile in keeping with President Obama's long-term goal of seeking a world without nuclear weapons. The 2013 report notes a lack of transparency

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3 Mark A. Ryan, *Chinese Attitudes Toward Nuclear Weapons: China and the United States During the Korean War*, Armonk, N.Y.: M.E. Sharpe, 1989; and Tong Zhao, "Nuclear Signaling and China's Perception About Nuclear Threat: How China Handled Nuclear Threats in the Cold War," paper presented at International Studies Association Annual Conference, March 2011.

4 *China Strategic Missile Force Encyclopedia*, 2012, p. 7.

5 For more on the "new triad" see David S. McDonough, "The 'New Triad' of the Bush Administration," *International Journal*, Vol. 59. No. 3, 2004. Several Chinese participants in a track 2 dialogue called the new triad "the most dynamic and potentially threatening element in China's nuclear security environment" ("Conference on U.S.-China Strategic Nuclear Dynamics," jointly organized by the Center for Strategic and International Studies [CSIS], Institute for Defense Analyses [IDA], and the RAND Corporation, Beijing, June 20–21, 2006).

6 *China Strategic Missile Force Encyclopedia*, 2012, p. 14.

7 DoD, *Report on the Nuclear Employment Strategy of the United States*, Washington, D.C., June 12, 2013, p. 3; DoD, 2010.

in China's conventional and nuclear weapon programs but points out that the United States "remains committed to maintaining strategic stability in U.S.-China relations."[8]

Although the 2010 and 2013 reports were generally received positively in China, they did not fully ameliorate Chinese uncertainty over the direction of U.S. nuclear doctrine and the U.S. ability to conduct preemptive nuclear strikes against China.[9] Chinese strategists note with concern that the 2010 NPR reaffirmed that "there remains a narrow range of contingencies in which U.S. nuclear weapons may still play a role in deterring a conventional or [chemical or biological weapon] attack against the United States or its allies and partners."[10] Chinese scholars and nuclear strategists observe a lack of clarity over how and under what circumstances the United States will use its nuclear weapons itself constitutes a form of "nuclear coercion." U.S. adversaries might, for example, face uncertainty about whether large-scale conventional attacks or attacks on critical U.S. assets may trigger nuclear retaliation. Fundamental questions remain over which scenarios might prompt U.S. military planners to employ nuclear weapons first during a conflict.[11] They point out that U.S. nuclear submarines are equipped with SLBMs that can carry more than 1,000 nuclear warheads. These submarines provide the United States with the ability to attack hundreds of ground targets in the Asia-Pacific with very little warning or reaction time.[12]

Chinese strategists also note that recent U.S. doctrine calls for reducing the role of nuclear weapons by exploring "what objectives and effects could be achieved through integrated nonnuclear-strike options, and to propose possible means to make these objectives and effects achievable."[13] As the 2013 *Report on the Nuclear Employment Strategy of the United States* notes, "Although they are not a substitute for nuclear weapons, planning for nonnuclear strike options is a central part of reducing the role of

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8 DoD, 2013, p. 4. See also Lora Saalman, *China and the US Nuclear Posture Review*, Washington, D.C.: Carnegie-Tsinghua Center for Global Policy, February 2011.

9 For example, Chinese scholar Teng Jianqun notes that, on analyzing the 2010 NPR, the United States still has not changed its thinking on "global hegemony" (Lu Desheng: "Does 'Spring of Nuclear Disarmament' Come?—Interpretation of U.S. Nuclear Posture Review Report by Teng Jianqun, Director of Arms Control Research Center of China Institute of International Studies" *PLA Daily* [in Chinese], April 8, 2010). Another prominent Chinese scholar on nuclear issues, Yin Chengde, acknowledged U.S. efforts toward reducing the amount of nuclear weapons in the 2010 NPR, but concluded that "no fundamental changes in the US strategy of nuclear hegemony had occurred," which he sees as threatening China's second-strike capability (Yin Chengde, "The New START Treaty and the Legend of a Nuclear-Free World," 《国际问题研究》 [*International Studies*], July 13, 2010).

10 DoD, 2013, pp. viii, 16.

11 Noted Chinese scholar Li Bin also questions whether the U.S. will respond to a conventional attack on a U.S. aircraft carrier with a nuclear strike. See Li Bin, "Chinese Nuclear Policy Changes from 'Limited Retaliation' to 'Self-Defense,'" 《军情洞察》 [*Military Affairs Percipience*], June 22, 2009.

12 Li Bin and Nie Hongyi, 2008. For a discussion on U.S. number of nuclear-armed submarines and warheads, see Woolf, 2013, p. 16.

13 DoD, 2013, p. 5.

nuclear weapons."[14] Chinese strategists fear that the United States may seek to replace some of the traditional missions of nuclear weapons with advanced conventional forces and missile defenses. Teng Jianqun, director of the Arms Control Research Center at the Chinese Institute of International Studies and a retired PLA officer, summarized Chinese thinking on this point:

> Although [the U.S. NPR] said that the United States will not use nuclear weapons first against nonnuclear countries . . . the United States nevertheless has achieved absolute advantages in conventional weapons, has prevented missile defense systems from being restricted, and reserves options for using strategic bombers and long range ballistic missiles in conventional roles—the so-called "prompt global strike capability." [This] further reflects the confidence that the United States has to protect American interests even without relying on nuclear deterrence. Such a posture helps the United States take the moral high ground, suppress those countries intending to acquire nuclear weapons, and force them to accept the limitations by the NPT.[15]

Teng's focus on BMD and conventional missile technology highlights a growing concern among Chinese policymakers that such advances could render China's second-strike capabilities ineffective.

Ballistic Missile Defense

It is hard to overstate the importance of U.S. BMD as a driver of Chinese threat perceptions in the strategic arena.[16] An evaluation of the nuclear strategic environment by the Academy of Military Sciences, Chinese military strategists offered the following assessment of the impact of U.S. BMD systems on Chinese nuclear strategy:

> The Asia-Pacific anti-missile system of the United States will threaten the effectiveness of China's limited nuclear deterrents and produce detrimental effects on China's task of safeguarding her sovereignty, security, and unity. The imbalance of strategic power is caused by anti-missile defenses, and may in turn give rise to the danger of an escalating arms race. The continuing development of the missile defense systems may extend the arms race to outer space.[17]

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14 DoD, 2013, pp. viii, 16.

15 Lu Desheng, 2010.

16 Christopher P. Twomey and Michael S. Chase, "Chinese Attitudes Toward Missile Defense Technology and Capabilities," in Catherine M. Kelleher and Peter J. Dombrowski, eds., *Missile Defense: The Fourth Wave and Beyond*, Stanford, Calif.: Stanford University Press, 2015.

17 〈解读中国 '战略评估报告' 八大核心问题〉 ["Chen Zhou Analyzes Eight Core Issues in China's 'Strategic Evaluation 2013'"], 中国广播网 [China National Radio Online], June 26, 2014.

Beijing has always been attentive to the larger strategic context and meaning of missile defenses. The U.S. two-tiered Sentinel system, proposed and seriously considered in 1967, was justified primarily against a Chinese nuclear threat.[18] Chinese criteria in judging the impact of deployed military systems include how the specific offense-defense configuration could affect strategic stability, the impact on major-power relations and regional security, and the implications for global arms control processes and direction. Hence, missile defense has seldom been treated merely as a military issue. Chinese strategists argue that U.S. missile defenses will have long-term negative effects on arms control and nonproliferation efforts, as well as on broader international relations and strategic trust between the United States and China. The U.S. pursuit of a BMD system further reinforces the Chinese perception that Washington is seeking absolute security at the expense of others.[19]

The Chinese authors of *Strategic Evaluation 2013* argue that U.S. missile defenses will hinder the international arms control process and could touch off a resurgence of the arms race, especially in outer space.[20] Second-tier nuclear weapon states, in the authors' view, will be less interested in joining multilateral nuclear disarmament negotiations if they believe missile defenses will jeopardize their own ability to conduct nuclear counterattacks and will instead focus on improving the penetration capabilities of their own systems—in part through technological improvements (e.g., the use of penetration aids) but also by increasing the number of deployed systems. The *China Strategic Missile Force Encyclopedia* similarly notes,

> The US missile defense deployment system has widened the gap between the United States and other midlevel nuclear powers. This will hinder midlevel nuclear countries from participating in the process of nuclear disarmament, forcing them to consider enhancing their nuclear forces to balance this defense system.[21]

More pointedly, Chinese strategists have also expressed concerns about what U.S. missile defenses might suggest about Washington's strategic intentions toward Beijing and the extent to which U.S. missile defenses could undermine the credibility and effectiveness of China's nuclear retaliatory capabilities. Chinese experts and officials at track 2 dialogues have articulated concerns that the United States would tailor its

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18 Ashton B. Carter and David N. Schwartz, eds., *Ballistic Missile Defense*, Washington, D.C.: Brooking Institution, 2010.

19 This prompted retired Chinese general Peng Guangqian to claim that the United States is "is aimed at establishing its global absolute supremacy, affecting its global absolute control, and guaranteeing its global absolute security." See Kang Yongsheng, "The U.S. Military's Strategic Consideration Behind the Building of the Asia-Pacific Missile Defense System," 《中国青年报》 [*China Youth Daily*], June 28, 2013.

20 "Chen Zhou Analyzes . . . ," 2014.

21 *China Strategic Missile Force Encyclopedia*, 2012, p. 25.

nuclear forces to negate China's second-strike capability.[22] Separately, Chinese scholar Li Bin has underscored the potential impact of a capable BMD system on China's second-strike capability:

> Chinese nuclear deterrence depends directly on American perceptions about the Chinese nuclear retaliatory capability. The deployment of NMD [national missile defense] would change these perceptions and therefore significantly undermine the Chinese deterrent. Without the backup of NMD, the Americans would always worry about a Chinese retaliation with the few Chinese nuclear weapons that might survive a U.S. first nuclear strike against China . . . . If the Americans tended to believe that a first nuclear strike plus a NMD system would be able to disarm the Chinese nuclear retaliatory capability, the U.S. could become incautious in risking nuclear exchanges with China in a crisis.[23]

As Li's statement indicates, it is the combination of a small, if recently much improved, retaliatory capability with adversary missile defenses that gives Chinese planners most pause about the present state of China's nuclear force structure. Li indicates that China's response to improvements in U.S. missile defense capabilities could include some combination of the following:[24]

- establishing the capability to overwhelm missile defenses by building more ICBMs or by MIRVing Chinese ICBMs to multiply the number of warheads
- equipping Chinese missiles with the ability to release decoys or chaff to fool sensors
- lowering the observability of warheads by employing stealth technologies
- developing maneuverable reentry vehicles
- increasing the ability of Chinese ICBMs to survive a first strike by deploying more mobile missiles and/or SSBNs
- building missile defense to protect Chinese ICBMs
- raising the alert level of Chinese nuclear forces.

In addition to concerns about the U.S. deployment of ground-based interceptor systems as part of the NMD program, Chinese strategists also view the U.S. development of theater missile defense (TMD) in Northeast Asia as problematic. Concerns about TMD were articulated in Chinese government policy documents as early as 2004, when the authors of the *Science of Second Artillery Campaigns* predicted that certain countries will use "great strengths" in promoting TMD systems, with the help of

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22 "Conference on U.S.-China Strategic Nuclear Dynamics," 2006.

23 Li Bin, 2001.

24 Li Bin, 2001, p. 5.

"allies' cooperation as support."[25] The authors concluded that such systems would serve to "lower our missile penetration probabilities" and produce "grave impacts on our missile firepower strikes."[26] The TMD threat will, one scholar has argued, force China to "improve its capabilities of survival and penetration."[27]

On August 23, 2012, the *Wall Street Journal* reported that the United States was planning a major expansion of missile defenses in Asia.[28] According to U.S. officials, the move was designed to contain threats from North Korea. The planned buildup was part of a defensive array that could cover large swaths of Asia. Under the expansion, a new forward-based X-band (FBX) radar was deployed in southern Japan, complementing a similar system already deployed in northern Japan. Separately, a Pave Paws radar site was completed by Raytheon in Taiwan in March 2013 for the use of the Taiwan military. These deployments complement U.S. Navy plans to expand its fleet of BMD-capable warships from 26 to 36 by 2018, with more than 60 percent deployed to Asia.[29] The United States is also deploying mobile U.S. missile defense interceptor missiles, discussed further below.

China sees the U.S. decision to deploy TMD systems in the context of the broader U.S. political strategy in East Asia and its policy toward China, in particular the U.S. "rebalance" to Asia. China sees TMD as yet another deliberate step that the United States has taken to strengthen the U.S.-Japan military alliance, increase intelligence sharing, and promote research and development cooperation.[30] The decision to deploy Terminal High-Altitude Area Defense (THAAD) system to South Korea, announced formally in July 2016, suggests an expanding degree of regional anti–ballistic missile cooperation and exacerbates Chinese fears of being surrounded by a set of alliances aimed at containing Beijing.[31] Other concerns are more directly related to Chinese security and nuclear deterrent capability.

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25 Yu Jixun, 2004, p. 63.

26 Yu Jixun, 2004, p. 63.

27 "China Warns of Response to U.S. Missile Defense," *Global Security Newswire*, July 19, 2012; Te-ping Chen and Alastair Gale, "China Warns on Proposed New Missile Defense System for Seoul," *Wall Street Journal*, May 29, 2014. One scholar questioned the deployment of the X-band radar so close to the Chinese mainland and concludes that the logical target of continued TMD developments is not North Korea, but China (Li Bin, "China and the New U.S. Missile Defense in East Asia," Washington, D.C.: Carnegie Endowment for International Peace, September 6, 2012).

28 Adam Entous and Julian E. Barnes, "U.S. Plans New Asia Missile Defenses," *Wall Street Journal*, August 23, 2012.

29 Entous and Barnes, 2012; Malcolm Moore, "Pentagon Plans New Missile Defences in Asia," *Daily Telegraph*, August 23, 2012.

30 〈美日导弹防御合作马不停蹄, 两国提升情报分享〉 ["U.S., Japan Cooperation on Missile Defense Unrelenting, Two Countries Upgrade Intelligence Gathering"], 《环球时报》 [*Global Times*], September 9, 2006.

31 "South Korea and U.S. Agree to Deploy Missile Defense System," *New York Times*, July 7, 2016; "South Korea, U.S. to Deploy THAAD Missile Defense, Drawing China Rebuke," Reuters, July 8, 2016.

Of greatest concern to China is the possible integration of TMD with U.S. NMD. Wu Riqiang, professor at Renmin University, suggests that FBX could track Chinese missiles on trajectories to the United States.[32] Depending on the effective range of the FBX (which he estimates might be between 1,200 and 2,000 km, depending on the size of the target), systems in Japan might track Chinese SLBMs launched from the South China Sea or possibly ICBMs launched from central or southern China.[33] While U.S. ground-based interceptors located in Alaska or California could not use forward-based radar for targeting solutions, the radars could, Wu argues, compromise China's retaliatory capability in several other ways. First, they might give the United States more warning time and, hence, more battle space. Second, longer radar tracking time might better enable the United States to discriminate decoys from warheads, since more information will tend to improve discrimination. And third, Wu argues, if the FBX could see the warhead and decoy separation, it might identify the decoys and actual warheads at that time.[34]

Some Chinese concerns are rooted in technological uncertainty, as in the case of the FBX ranges noted above. U.S. programmatic uncertainty and questions about Washington's future course are also issues. Chinese strategists note that, at present, U.S. interceptors deployed in Asia are, at best, capable of intercepting MRBMs, but not IRBMs or ICBMs, given the higher trajectories of the latter two categories of systems. However, the United States and Japan have jointly developed and begun live-fire testing of a new Aegis-launched missile (the SM-3 Block IIA) capable of intercepting IRBMs.[35] In March 2013, the United States canceled its program to develop a follow-on to the Block IIA, the SM-3 Block IIB, which was slated to provide sea- and land-based defense against ICBMs. Whether deployed in Asia or off the U.S. coast, the SM-3 IIB might have provided a layered defense against incoming ICBMs and SLBMs. That layered defense, in conjunction with improved X-band radar capabilities, could have plausibly enabled a shoot-look-shoot capability and produced a far more effective missile defense against China.[36] Despite the system's cancellation, Chinese planners believe they must plan against the possibility that development of the SM-3 IIB, or something like it, could restart.

In light of trends in BMD development, few Chinese scholars and policymakers see a path out of the Sino-American nuclear security dilemma. Prominent nuclear aca-

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[32] Wu Riqiang, *Why China Should Be Concerned with U.S. Missile Defense? How to Address It?* Atlanta: Georgia Institute of Technology, Program on Strategic Stability Evaluation, undated.

[33] Of note here, the FBX recently deployed to southern Japan would be better positioned to track trajectories from central China than would the preexisting systems in Aomori Prefecture.

[34] Wu Riqiang, undated.

[35] U.S. Missile Defense Agency, "U.S.-Japan Cooperative Development Project Conducts Successful Flight Test of Standard Missile-3 Block IIA," Fort Belvoir, Va.: U.S. Department of Defense, December 8, 2015.

[36] Wu Riqiang, undated.

demics, such as Li Bin, while hinting of countermeasures, such as dummy warheads and deception, as a low-cost alternative to an arms race, ultimately conclude that the inherent uncertainty brought about by nuclear weapons technology forces policymakers to prepare for worst-case scenarios:

> Theoretically, the U.S. missile defense would undermine the development of China's nuclear retaliatory capability. Therefore, China is bound to take measures to maintain the effectiveness of its nuclear deterrent. From an economic perspective, an arms race in offensive nuclear weapons and missile interceptors would be disadvantageous to both countries. China could presumably employ such low-cost countermeasures as dummy warheads, which could alleviate strategic weapon competition. However, because the technology is uncertain, decisionmakers may not be able to clearly foresee the long-term relationship between mutual development [of weapons systems] and restraint. So, facing the development of U.S. missile defenses, China has to adopt alternative measures. Thus, China will face uncertainties on its path toward the development of strategic missiles.[37]

Conventional Prompt Global Strike

U.S. plans for CPGS call for the capability to strike targets anywhere in the world in as little as an hour. A number of different technologies have been explored, including an HGV that could be deployed on modified Peacekeeper missiles. Other systems have been considered and rejected, including conventional warheads mounted on Trident II SLBMs. Whatever system is ultimately chosen, if any, will represent a niche capability that will be deployed only in small numbers.[38]

Chinese analysts view CPGS, along with BMD, as part of a larger U.S. effort to achieve "absolute security" [*juedui anquan*]—the pursuit by U.S. military planners of numerical and technical superiority over all potential adversaries and of the ability to neutralize any countermeasures or retaliation.[39] Of the four items listed in the 2013 *Science of Strategy* as elements of "the nuclear security environment faced by China,"

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[37] Li Bin and Nie Hongyi, 2008, p. 4.

[38] Amy F. Woolf, *Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues*, Washington, D.C.: Congressional Research Service, February 24, 2016.

[39] As one analyst notes, the Obama administration seeks to continue to maintain a "leading-edge in nuclear technology and to consolidate and expand the conventional military strength so as to maintain and strengthen its 'absolute security'" (王志军 [Wang Zhijun], 〈论美国 '绝对安全' 神学政治与奥巴马 '无核世界思想'〉 ["On the United States' Political Theology of 'Absolute Security' and Obama's 'Nuclear-Free World'"], 《国际论坛》 [*International Forum*], Vol. 1, 2010). Other analysts use the term *global control* [*quanqiu kongzhi*] to describe U.S. policy in this regard (Ning Wen, Jing Bo, and Tang Li Wen, 〈美国快速全球打击计划深讨与启示〉 ["Illuminating and Discussing U.S. Prompt Global Strike Plan"], 《装备指挥技术学院学报》 [*Journal of Academy of Equipment*], Vol. 3, 2011).

CGPS was listed third, reflecting a degree of concern about CPGS that may be difficult for U.S. analysts to appreciate given its expected "niche" role only in U.S. defense planning.[40] Chinese articles on CPGS reveal both an acute interest in its technical capabilities and a deep fear of the potential repercussions of an operational U.S. capability. Chinese analysts tend to view CPGS as a threat to China's nuclear weapon systems and strategy and to its command and control centers and space assets. They are particularly concerned that such systems could be employed to disable Chinese nuclear weapons without crossing a "nuclear threshold," thus rendering any nuclear counterstrike by China as an escalatory and destabilizing move.[41]

Some Western arms control experts have expressed concern about the escalatory potential of CPGS, such as the difficulty that those on the receiving end of such an attack might have distinguishing CPGS from a nuclear attack if, for example, ICBMs equipped with conventional warheads were employed. Adjustments have been made to CPGS programs and the use of ICBMs excluded from consideration partly as a result of this logic.[42] However, some concerns are harder to mitigate. China's Rocket Force is charged with overseeing China's conventional and nuclear missiles, and Chinese planners worry that a CPGS attack might target command and control centers responsible for both nuclear and conventional arsenals, thus compromising China's nuclear retaliatory capability.[43]

Chinese analysts tend to lump all CPGS weapons that U.S. planners have ever considered into the category of potential future threats, regardless of whether there were ever associated programs. Indeed, many Chinese discussions of CPGS appear to refer to all long-range precision strike. Given past U.S. consideration of space-based weapons, this logic also explains why Chinese analysts place CPGS (along with missile defense) into a narrative of U.S. pursuit of "space weaponization." As one such analyst notes:

> United States' PGS unsettles crisis stability in outer space and will have a severe impact on strategic stability. Advancing the practice of weaponizing outer space not only causes a direct threat to its peaceful use, but also damages the national sovereignty [of other states] and personal privacy. The U.S. obstruction of negotia-

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[40] The text reads: "Innovations in conventional military capabilities among the major powers are becoming more sophisticated, namely the United States' development of prompt global strike, which, once operational, has the capacity to target China's nuclear weapons with conventional strikes" (Shou Xiaosong, 2013, pp. 170–171).

[41] One article written by three academics affiliated with the Armament Command Technology Party School points out that CPGS will "challenge [China's] nuclear strategy because the U.S. can use conventional missiles to strike our nuclear installations" (Ning Wen, Jing Bo, and Tang Li Wen, 2011).

[42] See Woolf, 2016. See also David E. Mosher, Lowell H. Schwartz, David R. Howell, and Lynn E. Davis, *Beyond the Nuclear Shadow: A Phased Approach for Improving Nuclear Safety and U.S.-Russian Relations*, Santa Monica, Calif.: RAND Corporation, MR-1666-NSRD, 2003, p. 5.

[43] Saalman, 2014, p. 7.

> tions on the preventing space weaponization has led to frustrations in the international arms control [community].[44]

Perhaps more reasonably, interviews with Chinese strategists also suggest that their concern extends to the ISR capabilities associated with CPGS. These might, regardless of the attack systems employed with them, compromise the security of their mobile missile force.[45]

Several Chinese articles point to the "strategic ambiguity" [战略模糊性] introduced by CPGS. They highlight the fact that CPGS blurs the distinction between conventional strategic and tactical missiles and thereby complicates escalation problems. If, for example, the United States employed CPGS systems to achieve strategic ends, adversaries would be forced to adopt escalatory countermeasures to offset whatever strategic advantages CPGS attacks might confer on the adversary.[46] These articles also note that strategic ambiguity about CPGS employment could be intentional on the part of the United States, buttressing deterrent or coercive leverage by leaving potential target countries, such as China, Iran, and North Korea, guessing as to how or if the United States would deploy such assets.[47]

Conclusion

The United States and its strategic forces and strategy are overwhelmingly the most important planning factors for Chinese nuclear strategists today. Although other regional states are likely to become more important in the future than they are now, considerations related to U.S. strategic forces will likely remain primary. Overall, Chinese experts and strategists believe that the qualitative improvements to the Chinese nuclear inventory in recent years have enhanced the survivability of China's nuclear forces and made the country's deterrent capability more robust. However, Chinese strategists remain deeply concerned about the possibility that new U.S. doctrines, technologies, and priorities could jeopardize the future effectiveness of this

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[44] Xu Nengwu, "The Threats and Challenges to Outer Space Security Posed by the Adjustment of the U.S. Strategic Deterrent System," *National Defense Science & Technology*, Vol. 34, No. 2, April 2013.

[45] Interviews, Beijing, May 2014.

[46] As one analyst put it, "CPGS destroys traditional notions of what constitutes tactical, strategic, and nuclear systems and their use. Thus, traditional notions of nuclear deterrence and nuclear balance might give way to a new round of arms completion" (Wei Zilin et al., "Current Situation and Development of U.S. Outer Space Prompt Global Strike System," 《飞航导弹》 [*Aerodynamic Missile Journal*], Vol. 2, 2012). Other analysts note that CPGS has "similar strategic effect" as nuclear weapons, thus upsetting the nuclear balance and giving the United States a strategic edge (Li Dapeng and Liu Shunsheng, "Military-Strategic Balance in the 21st Century and the Impact Factors," *National Defense Science and Technology*, Vol. 34, No. 2, April 2013, p. 1).

[47] "U.S. 'Prompt Global Strike' Threatens China, Russia," *Asia Times* (in Chinese), February 4, 2010.

deterrent. They appear convinced that a portfolio of further improvements to Chinese nuclear forces will likely be required to ensure they remain capable of implementing their deterrent and retaliatory functions.

China is prone to view BMD and CPGS as parts of a larger U.S. strategy designed to upset traditional notions of nuclear strategic balance and achieve "absolute security," a perspective that highlights broader concerns over the larger direction of American conventional and nuclear strategy. U.S. forces and actions are not the only drivers of Chinese nuclear planning, but development in the United States, particularly the future development of BMD and CPGS, will have a profound influence on the future shape of Chinese nuclear forces. Bureaucratic, technological, and inertial forces may, together with developments in China's nuclear relationships with other powers, also push China toward a higher quality, more versatile, and larger nuclear force structure, but the most powerful push would likely come from U.S. actions or developments that appear to jeopardize China's assured retaliatory capability.

CHAPTER SIX

Nested Security Dilemmas and China's View of Other (Non-U.S.) Nuclear Powers

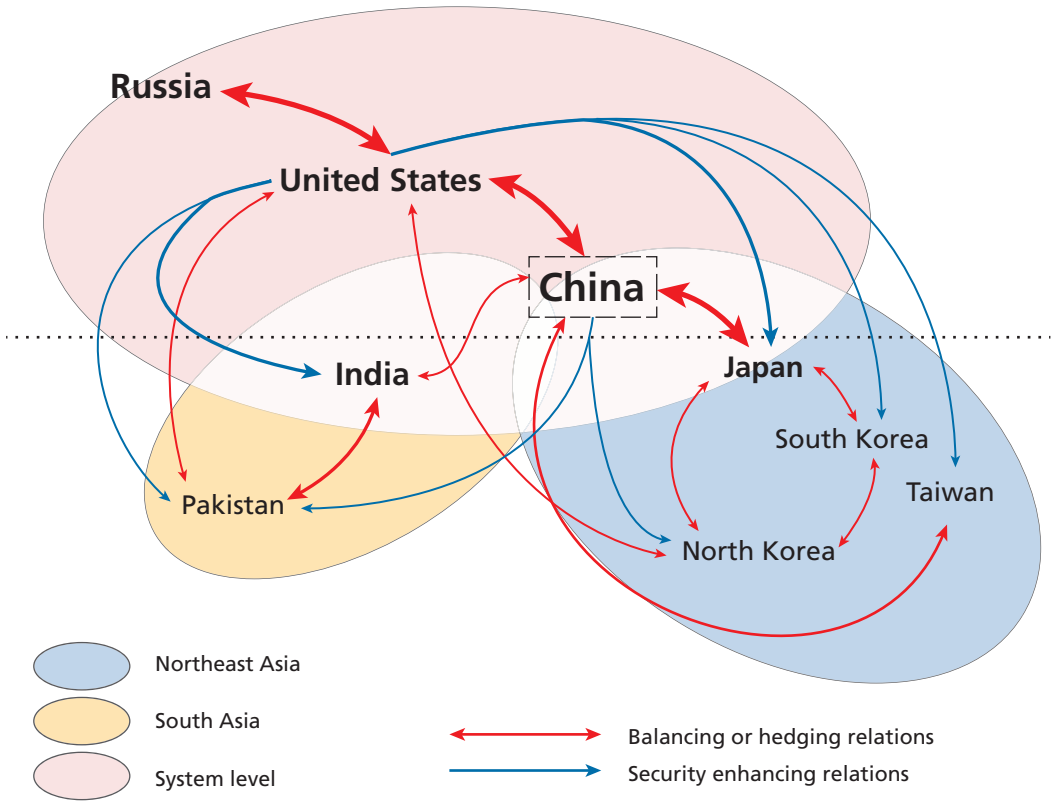
Although deterring U.S. nuclear attack or coercion remains the primary consideration in Chinese nuclear strategy, nuclear developments in other states—particularly in India, Pakistan, Russia, North Korea, and Japan—increasingly inform Chinese perceptions of its evolving security environment. Given growing regional nuclear arsenals and the new salience of nuclear issues in regional security, these countries are likely to take on even greater significance to Chinese nuclear planning in the future. This chapter addresses Chinese views of developments in each of the countries just listed, highlighting in particular the evolving importance, for different reasons, of India and Russia. Before moving on to discuss China's perspective on individual countries, however, we briefly discuss the more general problem of multilateral nuclear dynamics in the Asia-Pacific region.

Nested Security Dilemmas

China is embedded in a complex set of regional security competitions within which the actions of even ostensibly friendly states can pose indirect but potentially serious problems for China (Figure 6.1). The actions of these states may, for example, cause other countries that are viewed as potential adversaries to buttress their military capabilities in ways that are antithetical to China. For example, Chinese strategists do not view Pakistan as a direct security challenge, but Pakistani military capabilities are a major driver of Indian security policy. The modernization of Indian forces can, in turn, pose challenges to Chinese planners. Although these dynamics may apply to conventional, as well as nuclear, security, they may be particularly complex and acute on the nuclear side, given the number of countries' interests that can be simultaneously affected by delivery systems of very substantial range.

At the system level, although the United States and China cooperate in a number of important arenas, they are also engaged in security competition or "hedging." At the regional level, China also views India and Japan as potential adversaries, although again, it also cooperates with these states in many areas. Complicating this picture, the

Figure 6.1
Nested Security Dilemmas



RAND *RR1628-6.1*

United States, India, and Japan are also all involved in some degree of security competition with other regional states. In East Asia, the United States, Japan, and South Korea are deeply concerned about North Korea's growing nuclear capabilities. Concerns about North Korea have largely motivated U.S. NMD and U.S.-Japan and U.S.–Republic of Korea cooperation on TMD—issues of obvious concern to China. South Korea, for its part, remains deeply suspicious of Tokyo, and security developments in Japan influence South Korean security decisionmaking. In some cases, the results can affect Chinese security interests. The recent push to revise the civilian nuclear agreement between Washington and Seoul and permit certain types of reprocessing in South Korea was justified in large measure by similar allowances for Japan.

In the South Asian context, we have already noted the important role Pakistan plays in shaping Indian security policy and the consequent implications for Chinese security. Chinese strategists do not regard Russia as a potential military adversary but, incongruously, are concerned about discussions of "China threats" in Russia. And Chinese analysts see Russian nuclear policy as working to shape international strategic

trends and thinking. Russia keys on local, European, and U.S. threats in considering its own strategy and force structure, but its actions have at least indirect consequences for Beijing.

Given the growing nuclear arsenals of several states around China's periphery and the increasing complexity of interactions between regional states, Asia's nested security dilemmas are likely to significantly influence Chinese nuclear thinking in the coming decade. As a driver of insecurity and competition, causality within nested security dilemmas can run in various directions. One of the main features of this situation is the potential for any given nuclear development to affect the security interests of states not originally targeted or even seriously considered by the original actor. In the conclusion of this chapter, we address further the implications for the United States. In the following sections of this chapter, we address nuclear developments in several countries (Russia, India, Pakistan, North Korea, and Japan) and their direct and indirect impact on Chinese nuclear thinking.

Russia as Contributor to Global Nuclear Atmospherics

China's views about Russia's nuclear forces and capabilities have changed significantly since the end of the Cold War. During the Cold War, Russian nuclear capabilities and strategy were key considerations in shaping China's nuclear doctrine and force structure. Although Russia is no longer viewed as a significant threat and is therefore a less important planning factor today, PLA leaders closely monitor nuclear developments in Russia. PRC military publications and press articles note post–Cold War changes in Russian strategy that indicate an expanded role for nuclear weapons and the relaxation of previous restraints on their use. In addition, Chinese publications trace several Russian force modernization efforts as Moscow has reassessed its relationship with the United States and the North Atlantic Treaty Organization (NATO) since the turn of the century.

Despite this close observation and some trepidation about Russian tactical nuclear weapons in the Far East, PRC planners and policymakers do not view Russia as a security competitor. Rather, Chinese efforts to maintain awareness of Russian developments focus on Russia's role as a major nuclear power. Monitoring developments in Russia is thus essential to understanding the role nuclear weapons play in the continuously evolving and increasingly competitive international security environment. According to Chinese strategists, Russia's nuclear force developments—much like China's—are seen largely as a response to the United States and to U.S. allies' efforts to maintain a hegemonic international position.

Soviet Union as a Primary Cold War Threat

During the Cold War, the Sino-Soviet border conflict of 1969 marked a shift in the thinking of China's political and military leaders, convincing them that the Soviet Union presented a greater threat than the United States did. The Soviets' use of nuclear signaling in 1969, including mock attacks on PRC nuclear facilities, demonstrated a significant level of coercive intent.[1] Consequently, China's military strategic guidelines in the early 1970s to mid-1980s designated the Soviet Union as "the main target of defensive operations."[2] In the face of an overwhelming disparity of nuclear capability, China's nuclear posture was centered on maintaining the ability to conduct a second strike following a disarming first strike by the Soviets. This requirement likely shaped China's force structure and, specifically, development of the DF-4 and DF-5 missiles, which were designed to be capable of targeting Moscow.[3] Beginning in 1971, Second Artillery's DF-4s were moved to Qinghai and other sites in Northwest China to range Soviet targets more effectively.[4]

The underlying theme in PRC nuclear force development was China's recognition of Soviet nuclear superiority. Beijing understood that addressing this discrepancy in a symmetrical fashion would be unproductive and prohibitively costly. Hence, China's nuclear strategy emphasized attacking countervalue targets and did not attempt to develop significant counterforce capabilities. But the strategy did require that a portion of China's missile force be capable of surviving a Soviet first strike and then penetrating its missile defenses. In part because of the skepticism of Chinese leaders about the utility of nuclear weapons beyond nuclear deterrence, Beijing pursued a three-part approach: developing a small force capable of threatening the Soviet Union with significant damage; building a defensive posture emphasizing survivability; and mitigating the effects of nuclear attack through civil defense, redundancy, and hardening. There was effectively no high-level support for building large, technically capable nuclear forces.[5]

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1 Lewis, 2007, pp. 15, 67; and Michael S. Gerson, *The Sino-Soviet Border Conflict: Deterrence, Escalation, and the Threat of Nuclear War in 1969*, Alexandria, Va.: Center for Naval Analyses, 2010. During the conflict, China's nuclear bases were under order to prepare defenses as Soviet aircraft conducted mock attacks on PRC nuclear facilities. Despite Mao's order that "nuclear bases should be prepared for the enemy bombardment," Second Artillery was not ordered to a higher state of alert, and most Chinese preparations in response to the Soviet threat centered on survival using hardening and dispersal. These efforts were a portion of a broader "war preparation" campaign undertaken in 1969 that sought to make Chinese defense industry and economic sectors redundant and survivable.

2 David Michael Finkelstein, "China's National Military Strategy: An Overview of the 'Military Strategic Guidelines,'" in Roy Kamphausen and Andrew Scobell, eds., *Right Sizing the People's Liberation Army: Exploring the Contours of China's Military*, Carlisle, Pa.: Strategic Studies Institute, U.S. Army War College, 2007, p. 93.

3 Lewis and Xue, 1988, p. 66.

4 Lewis and Xue, 1988, p. 213.

5 For instance, Zhang Aiping, at one time China's defense minister, argued that "it is unnecessary for us to achieve tremendous accuracy . . . . I don't think there is too much difference between the results, provided China's

The PRC's early nuclear force development, the perceptions on which these efforts were based, and the resulting plans for confronting the Soviet Union raise several important points for understanding the Rocket Force's current modernization efforts. While we should not assume a linear projection based on this history, the historical record may nevertheless shed light on Chinese thinking when facing an existential threat from an enemy with vastly more nuclear weapons at its disposal.

China's leaders appeared to question whether the Soviets would initiate a nuclear strike on China, particularly in the 1969 border conflict. There is disagreement about whether China placed its strategic forces on alert in what is widely regarded as the most serious foreign policy crisis that China had yet faced as a nuclear power.[6] Although China's leaders called for advanced preparations against Soviet nuclear strikes, a report from senior military officials to the CMC ultimately concluded that a Soviet nuclear attack was unlikely.[7] This conclusion is significant because it indicates that, in a major crisis with potentially devastating consequences, the use of nuclear weapons and the idea of conflict escalation were not central to the PRC's approach to planning for or managing the crisis.

Beijing's adoption of a nuclear force of modest size and capability was closely related to China's views on the limited efficacy of nuclear weapons. This view of nuclear weapons was, in turn, partly shaped by China's experiences with the Soviet Union. China's initial emphasis on avoiding nuclear coercion began with U.S. nuclear threats during the 1950s but was later applied to relations with the Soviet Union as the relationship with Moscow deteriorated. As a result, China's leaders were satisfied with much lower overall numbers to satisfy the requirement for basic survivable second-strike capability. The Soviet collapse in 1990 reinforced Beijing's emphasis on avoiding the economic and political mismanagement that led to collapse and strengthened its determination to avoid costly nuclear arms races. This does not suggest that Chinese leaders will not further enhance their nuclear forces should their effectiveness be in doubt, but it does suggest that there might be limits on the speed and degree of change.

A New Context: China's Views of Russia's Nuclear Forces in the "New Era"

China's perspective changed fundamentally with the collapse of the Soviet Union and the end of the Cold War, but Russia still plays an essential role in PRC nuclear thinking. Both sides present the Sino-Russian relationship as a strategic partnership. Fu Ying, the chair of the Foreign Affairs Committee of the National People's Congress,

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ICBM misses its predetermined target, the Kremlin, and instead hits the Bolshoi Theater" (Lewis, and Xue, 1988, p. 214). This anecdote reflects the central concern for China's leaders in its approach to a vastly superior nuclear power: the ability to destroy urban areas or soft military targets in a retaliatory strike.

6 Lewis, 2007, p. 15; Gerson, 2010, p. iv.

7 Lewis, 2007, p. 79.

has written that the two are "close, but not allies."[8] Chinese strategists and planners do not identify Russian nuclear forces as a direct threat to China but do note the continued Russian deployment of tactical nuclear weapons in the Far East. More broadly, they see Russian nuclear developments as shaping the global atmospherics of nuclear security issues. Chinese decisionmakers view the overall direction of Russian nuclear developments as troubling. Moscow has taken a progressive series of steps that increases the role of nuclear weapons in military strategy and lowers the threshold for their use, setting an example others might follow.

As early as 2006, Chinese analysts noted that Russian military spending was rising and that Moscow had "stopped disarmament, strengthened its nuclear and anti-crisis capabilities, and announced that it will not abandon the nuclear first-strike option."[9] Needless to say, they have closely tracked the development of Russian nuclear forces and thinking since that time.[10] One Chinese publication discussed at length a 2002 Russian strategic concept to use "nuclear deterrence to support strategic mobility."[11] The concept emphasized preemptive strikes to simultaneously win two local military contests and suggested that, when significant Russian security interests were under threat, Russia would retain the right to use nuclear weapons in concert with conventional arms. Overall, these changes highlighted Russia's willingness to use nuclear weapons first to retaliate against large-scale conventional attacks.[12]

Chinese analysts have noted that these developments contribute to a more complex and challenging global nuclear environment. While Chinese strategists see these changes as destabilizing, they generally believe these modifications to policy came in response to U.S. and NATO military challenges. They are viewed as a logical, if unfortunate, reaction to the improved U.S. conventional precision strike capability and NATO encroachment into Russia's near abroad. Chinese strategists cast Russia's public statements that it reserved the right to strike first with nuclear weapons as being focused on "preventing the U.S. and NATO from diminishing its [Russia's] strategic space."[13] Most Chinese scholars maintain that Moscow and Beijing are united in viewing Washington as their "primary nuclear deterrence target" and that the "United States remains

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8 Fu Ying, "How China Sees Russia: Beijing and Moscow are Close, but not Allies," *Foreign Affairs*, January/February 2016.

9 Ren Xiangqun, "World Military Security Becoming More Complex by the Day," *Liaowang* [*Outlook*], October 2, 2006.

10 See, for example, 凌胜银，陈旺 [Ling Shengyin and Chen Wang], 〈俄罗斯国防建设浅析〉 ["Analysis of Russian National Defense Building"], *Siberian Times*, February 1, 2013. This source addresses Russia's movement away from its nominal no-first-use policy in some detail.

11 Shou Xiaosong, 2013, p. 56.

12 Shou Xiaosong, 2013, p. 56.

13 Shou Xiaosong, 2013, p. 58.

the greatest factor strengthening Sino-Russian strategic relations."[14] Moscow's strategy is seen as "joining with China to constrain the United States."[15]

Nevertheless, at least one Chinese analyst, Zhao Tong, places Russian nuclear modernization and Moscow's emphasis on nuclear weapons in the more value-neutral context of a U.S.-Russian "nuclear security dilemma" and highlights potential negative implications for Chinese security. He notes, for example, that renewed nuclear competition between the United States and Russia could undermine the Intermediate-Range Nuclear Forces Treaty or result in its abrogation. In that case, "the United States and Russia might put great effort into developing ground-based [IRBMs], and that could directly worsen China's security environment around its periphery."[16] Notably, Zhao is U.S.-educated and is employed at the Qinghua-Carnegie office in Beijing, so his views are probably not typical. That said, he writes widely on nuclear issues, and some of his articles (including the one quoted above) are posted on Chinese websites, such as that of the Chinese Academy of Social Science.

More broadly, Chinese strategists and planners continue to view Russia's nuclear capabilities as a benchmark by which to gauge Rocket Force modernization. For several decades, many in the U.S. and Russian arms control communities sought to reduce the MIRVing of missiles, an objective that would have been greatly advanced by START II, which would have banned MIRVs on ICBMs. (The treaty never went into effect.) Under New START, MIRVs are allowed, and all Russian ICBMs deployed (and planned) since 2010, as well as many of Russia's older missiles, are MIRVed. Three researchers at Chinese aerospace institutions concluded from trends in Russia, as well as from the MIRVed missiles France and Britain maintain, that, "nowadays, all the intercontinental strategic missiles being developed and which will be developed in the future by all major nuclear powers employ the multiple independently targetable warheads technology."[17] China has also shown great interest in Russian nuclear concepts. According to the *China Strategic Missile Force Encyclopedia*, Russia's nuclear forces are built on a "three-in-one" concept consisting of air-, land-, and sea-based systems, generally equivalent to the U.S. triad.[18] PLA strategists contend that this three-in-one system

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[14] Lora Saalman, Gu Guoliang, Zou Yunhua, Wu Riqiang, and Jian Zhang, "China's and Russia's Nuclear Relations," Beijing: Carnegie Endowment for International Peace, July 7, 2013.

[15] Author analysis of Chinese media reports. Also see《国家安全公民手册》[*Public Handbook on National Security*], 时事出版社 [Beijing: Shishi Press], 2003.

[16] 赵通 [Zhao Tong],〈美俄军备竞赛 '硝烟再起'〉["U.S.-Russian Arms Race: Gun Smoke Rising Again"],《中国社会科学报》[*Chinese Social Sciences Today*], July 17, 2015.

[17] 范瑞祥 张兵 张曙辉 [Fan Ruixiang, Zhang Bing, and Zhang Shuhui],〈国外战略导弹多弹头分导技术及其发展〉["Technology and Trends of Foreign Missile MIRVs"],《导弹与航天运载技术》[*Missiles and Space Vehicles*], May 2013, as cited in Zhao Tong and David Logan, "What if China Develops MIRVs?" *Bulletin of the Atomic Scientists*, March 24, 2015.

[18] *China Strategic Missile Force Encyclopedia*, 2012, pp. 127–128.

will eventually become a four-in-one system that relies heavily on space-based capabilities to support integration of conventional precision and nuclear strike capabilities.

Chinese publications generally note that recent Russian nuclear force modernization follows a sustained period of stagnation and uncertainty in Russia's national defense policy.[19] Russian President Vladimir Putin injected new life into Russia's modernization efforts in 2000 with new land- and sea-based nuclear capabilities (see Table 6.1). According to one Chinese publication, nearly all of Russia's Strategic Rocket Forces will possess new equipment by the end of this decade, up from 30 percent in 2012.[20] The same publication states that Russia's nuclear forces will be equipped with

Table 6.1
Russian Nuclear Forces

Type and Name	Basing Mode	Year Deployed	Launchers or Aircraft	Warheads per Launcher	Total Warheads
Strategic weapons					
ICBMs					
RS-18 (UR-100NUTTH)	Silo	1980	20	6	120
RS-20V	Silo	1988	46	10	460
RS-12M (Topol)	Mobile or silo	1988	90	1	90
RS-12M2 (Topol-M)	Silo	1997	60	1	60
RS-12M1 (Topol-M)	Mobile	2006	18	1	18
RS-24 (Yars)	Mobile or silo	2010	73	4	292
RS-26 (Yars-M)	Mobile	(2016)	—	3	—
Barguzin	Rail	?	—	4	—
RS-28 (Sarmat)		2020	—	10	—
ICBM subtotal			307		1,040
SLBMs (all types)			176		768
Strategic bombers			70		798
Strategic subtotal					2,606
Nonstrategic and defensive weapons (ABM/SAM)					1,950
Total warheads overall					4,556

SOURCE: Kristensen and Norris, 2016a.

[19] Shou Xiaosong, 2013, pp. 55–56. The 2013 *Science of Military Strategy* details a period in the early 1990s in which Russia was reevaluating its relationship with the United States and NATO. During this time, Russian defense capabilities atrophied significantly. The policy eventually stated stipulates that Russia's future intent was to not match numbers and capabilities of weapons but rather seek a "realistic deterrent."

[20] 张海明 [Zhang Haiming], 〈俄罗斯武装力量改革进入新阶段〉 ["Russian Military Equipment Reform Enters a New Stage"] 《国防》 [*National Defense*], June 2012.

more than 400 land- and sea-based ICBMs. These will include new ICBMs to replace the RS-24 "Yars" and RS-12 "Topol," as well as the Bulova SLBMs deployed on three Russian SSBNs. Other relevant modernization efforts include the continued deployment of early warning radars and an array of space-based platforms.

The absence of language in Russian government statements depicting China as a potential strategic threat reinforces Beijing's generally benign view of Russia. Russia's 2000 and 2010 military doctrine documents are silent on China.[21] Politically, Beijing and Moscow have continued to consolidate their relationship. Their most important bilateral strategic agreement—the 2001 Treaty of Good-Neighborliness and Friendly Cooperation Between the People's Republic of China and the Russian Federation—serves as a commitment not to use or threaten the use of force against each other. In the agreement, China and Russia stipulate that they will not target nuclear weapons against each other and that neither will use nuclear weapons first against the other.[22] Thus, while Russia has not maintained a no-first-use policy, it has essentially made this commitment to China.

Nevertheless, despite the apparent lack of mutual threat perception at the official level, Chinese analysts do note an asymmetry of views between the two countries at the unofficial level. Some Russian commentary describes China as a threat. An article on the China National Radio website summarizes an article by three Russians think-tank researchers, concluding that:

> If Chinese missile strength continues to increase on a large scale, China will first gain the ability to conduct a lethal strike against India, and later gain the same ability against Russia. If Russian strategic nuclear strength remains primarily silo-based, and if Strategic Rocket Forces elements deployed to bases close to China are not highly mobile, the latent threat to Russia posed by continued improvement to Chinese nuclear forces will be even greater.[23]

China also evinces some concern about Russian tactical nuclear weapons and missile defense. Russia's continued deployment of tactical nuclear weapons in the Far East highlights a continued lack of balance between U.S., Russian, and Chinese nuclear capabilities. It also suggests that Russia is more prone to hedge its bets with regard to China than vice versa. Chinese scholars have noted Russia's growing reliance on tacti-

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21 Russian Federation, "The Military Doctrine of the Russian Federation," February 5, 2010; Russian Federation, "Military Doctrine of the Russian Federation," 2014.

22 Treaty of Good-Neighborliness and Friendly Cooperation Between the People's Republic of China and the Russian Federation, July 16, 2001.

23 〈俄称中国核武仅次美俄 可对印饿致命核打击〉 ["Russia Labels Chinese Nuclear Strength Second Only to Those of the U.S. and Russia; Could Deliver Lethal Strike to India or Russia"], 中国广播网 [China National Radio], July 24, 2012.

cal nuclear weapons—an asset category China does not possess.[24] Recent track 2 dialogues highlight Beijing's unease with Russia's movement of military power to the Russian Far East and the Asia-Pacific, including deployment of nuclear-capable Su-27SM and Su-35 fighter aircraft. Chinese media also reports that the large-scale redeployment of tactical nuclear weapons represents Russia's "assassin's mace" for dealing with future nuclear arms competition in East Asia.[25]

China's concern with Russian missile defense capabilities has been evident since the 1970s. The DF-5 was designed and flight tested to improve its survivability against the missile defense systems deployed near Moscow.[26] In principle, missile defense presents numerous challenges for Chinese military and political leaders as they consider the viability and deterrent value of PLA nuclear forces. However, there has been little discussion of Russia's missile defense capabilities in Chinese publications and none identifying these developments as threatening to China. This relative silence stands in marked contrast to the vocal Chinese objections to the U.S development and deployment of missile defenses. Recent Chinese publications have highlighted Russia's movement of a Voronezh early warning radar, capable of detecting Chinese missile launches, to western Russia.

In the Russian case, nested security dilemmas that begin in Western Europe have had a limited direct affect on China to date but are nevertheless felt through their impact on global nuclear trends and atmospherics. The indirect effects on Chinese security may, in the future, be significant.

South Asia's Increasing Nuclear Prominence

Perhaps nowhere are nested security dilemmas likely to loom larger than in South Asia—specifically, in the complex interactions between Pakistan, India, China, and the United States. China has enjoyed close strategic ties with Pakistan since the early 1960s, with both sharing deep suspicions of the Soviet Union and India, which they regarded as a Soviet client state.[27] The end of the Cold War and evolving economic and political interests partially altered Beijing's calculations about its interests with regard to India. Economic reforms, first in China and later in India, created incentives for

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[24] Medeiros, 2007, p. xiv.

[25] 郭力 [Guo Li], 〈中国，如何不陷入'东亚核竞赛'泥沼〉 ["How Can China Avoid Falling into the Quagmire of Nuclear Arms Competition in East Asia?"], 《南方周末》 [*Southern Weekly*], November 30, 2006.

[26] Lewis and Xue, 1988, p. 66.

[27] For many years, starting in the mid-1970s and lasting through most of the 1990s (and possibly longer), China provided assistance to Pakistan's nuclear programs. Beginning in the 1980s and taking firmer hold during the 1990s, Beijing gradually embraced nonproliferation norms and created institutions to limit the export of sensitive materials. Director of Central Intelligence, *Chinese Policy and Practices Regarding Sensitive Nuclear Transfer*, Special National Intelligence Estimate 13/32-83, January 20, 1983; Medeiros, 2007.

deeper economic intercourse, and the two share a number of interests with regard to the larger world order and the place of developing states within it.[28]

Yet mutual suspicions and unresolved border disputes continue to dog the relationship between China and India. India is not currently a significant driver of China's nuclear force structure or policy but is assuming added importance in Beijing's strategic thinking, and that trend is likely to deepen.[29] New Delhi is enlarging and modernizing its nuclear forces. Pakistan's apparent willingness to use nuclear weapons in the event of conventional conflict with India places pressure on India's no-first-use policy. Any movement of Indian nuclear doctrine toward limited warfighting—even if designed primarily to address Pakistan's nuclear challenge—could push China in the same direction. And the emerging strategic relationship between the United States and India has raised questions in China about the New Delhi's future direction and intentions.

A 2016 SIPRI report estimates that India, Pakistan, and China each added roughly ten warheads during 2015, an annual rate of increase that appears to have held steady since 2012.[30] If true, India, with an economy less than one-quarter of China's, is matching the latter's rate of production—an enormous effort for India. For Pakistan, which has a total gross domestic product (GDP) that is less than 12 percent the size of India's, the figure represents a much greater level of effort. In terms of the power balance between China and India, roughly equal production also suggests a narrowing of the relative (although not absolute) gap between the nuclear arsenals of the two countries. As of early 2016, SIPRI estimated that Pakistan had an inventory of between 110 and 130 warheads, that India had produced between 110 and 120 warheads (and the weapon-grade plutonium for a total of 135 to 180 warheads), and that China maintained an estimated inventory 260 warheads.[31] Kristensen and Norris estimate that India has weapon-grade plutonium for a total of 135 to 180 warheads and that, by 2025, Pakistan could realistically have between 220 and 250 warheads, "making it the world's fifth largest nuclear weapons state."[32]

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[28] George J. Gilboy and Eric Heginbotham, *Chinese and Indian Strategic Behavior: Growing Power and Alarm*, New York: Cambridge University Press, 2012; Stephen Philip Cohen, *India: Emerging Power*, Washington, D.C.: Brookings Institution, 2001.

[29] Saalman, 2012, pp. 38–43; Xiaoping Yang, "China's Perception of India as a Nuclear Weapons Power," Washington, D.C.: Carnegie Endowment for International Peace," June 30, 2016.

[30] Shannon N. Kile and Hans M. Kristensen,"Trends in World Nuclear Forces, 2016," fact sheet, Stockholm: Stockholm International Peace Research Institute, June 2016; "Pakistan, India, China Beefed Up Nuclear Arms Arsenal in 2012: Study," *International News*, June 3, 2013.

[31] Kile and Kristensen, 2016.

[32] Hans M. Kristensen and Robert S. Norris, "Indian Nuclear Forces, 2015," *Bulletin of the Atomic Scientists*, Vol. 71, No. 5, September 1, 2015b, p. 77; Hans M. Kristensen and Robert S. Norris, "Pakistani Nuclear Forces, 2015," *Bulletin of the Atomic Scientists*, Vol. 71, No. 6, November 1, 2015c.

Nuclear policy and doctrine have been subjects of active debate in India, a debate that engages a wide range of officials, academics, and pundits. In part, the liveliness of the nuclear discussion and the diversity of viewpoints are functions of India's vibrant political system but are also partly driven by the nuclear circumstances the state is confronting. India faces two main security competitors, Pakistan and China. Both countries have nuclear arms but are dramatically different in terms of the nature and scope of the challenges they present and in in their relationships with India. Mutual security concerns and grievances between Beijing and New Delhi derive from territorial disputes and the border war of 1962 but are mitigated by political cooperation and growing economic links. Indian tensions with Pakistan run far deeper, the product of shared history; a violent separation; sectarian, ethnic, and religious differences; territorial disputes; and a series of wars and smaller clashes since independence.

Within 18 months of its 1998 nuclear tests, India had outlined its nuclear strategy, which was based on a "credible minimum deterrent," the adoption of a no-first-use policy, and the use of assured retaliation to inflict unacceptable damage on any state that struck India first. Implicit in this strategy was the assurance that India would not pursue tactical nuclear weapons or a nuclear warfighting strategy. However, Pakistan, much weaker in conventional weaponry than its Indian rival, has not adopted a no-first-use policy and has instead employed the implicit threat of nuclear escalation to deter conventional attack.[33] Pakistani officials have outlined redlines that might trigger Pakistan's first use of nuclear weapons, including the destruction of a large part of its conventional forces or the loss of large parts of its territory.[34] It has deployed tactical nuclear weapons to operational units and has reportedly integrated conventional and nuclear fire plans for contingency use.[35]

In India, Pakistan's posture has raised doubts about New Delhi's no-first-use policy and its strategy of massive retaliation. While the threat of retaliation might deter Pakistani first use during a conflict, it would also provide little flexibility. It also might not be credible in the context of battlefield employment of nuclear weapons and would do little to manage escalation in the event that nuclear weapons were actually employed. Unless a better and more credible answer can be found, Pakistan's threat of rapid escalation could negate Indian conventional superiority.[36] During the 2014 elec-

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[33] For more detail on the nuclear strategies of India and Pakistan, see Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict*, Princeton, N.J.: Princeton University Press, 2014, Chs. 3 and 4.

[34] Michael Krepon, "Pakistan's Nuclear Strategy and Deterrence Stability," in Michael Krepon and Julia Thompson, eds., *Deterrence Stability and Escalation Control in South Asia*, Washington, D.C.: Stimson Center, 2013.

[35] Krepon, 2013.

[36] All these issues, and the Indian discussion of them, are discussed in Toby Dalton and George Perkovich, "India's Nuclear Options and Escalation Dominance," Washington, D.C.: Carnegie Endowment for International Peace, May 19, 2016.

tion campaign, the Bhartiya Janta Party declared that it would revisit nuclear strategy, demonstrating that reservations about the no-first-use policy are not just academic but also reach into important political circles.[37] Before the election campaign ended, Bhartiya Janta Party leader Narendra Modi stipulated that India would not abandon the no-first-use policy, and there have been no moves to revise policy or doctrine since he became prime minister in May 2014. But as far back as 2010, Indian National Security Advisor Shivshankar Menon qualified "no first use" as "no first use against non-nuclear weapon states."[38] According to one Chinese analyst, China sees this "as basically a retraction of India's no-first-use policy."[39]

At the same time, Hans Kristensen has argued that, even without formal policy change, India already appears to be developing capabilities that may go beyond those strictly required by its announced minimum credible deterrent policy.[40] According to India's Defense Research and Development Organization, India is actively developing MIRVs, a quick-launch capability, and highly accurate missiles—all capabilities that would be useful for a nuclear warfighting or counterforce strategy but that are not absolutely necessary for a policy of assured retaliation.[41] The Defense Research and Development Organization will deploy the new Agni-5 missile in canisters within which warheads and missiles must be mated before loading, effectively preventing the peacetime separation of components that was heretofore a core element of India's efforts to demonstrate the credibility of its no-first-use policy.[42]

Within the Sino-Indian relationship, attention to military and security issues continues to be highly asymmetrical, with Indian strategists giving far more attention to China than Chinese strategists do to India.[43] In part, this is a function of the more top-down nature of discussion, especially in authoritative sources, on security issues in China. Authoritative Chinese commentary follows official formulations, in this case placing the discussion largely within the narrative of Chinese-Indian win-win diplomacy and the "strategic and cooperative partnership for peace and prosperity" signed

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37 P. R. Chari, "India's Nuclear Doctrine: Stirrings of Change," Washington, D.C.: Carnegie Endowment for International Peace, June 4, 2014.

38 Shivshankar Menon "Speech by NSA Shri Shivshankar Menon at NDC on 'The Role of Force in Strategic Affairs,'" Government of India Ministry of External Affairs website, October 21, 2010.

39 Xiaoping Yang, 2016.

40 Hans M. Kristensen, "India's Missile Modernization Beyond Minimum Deterrence," FAS Strategic Security Blog, October 3, 2013.

41 Kristensen, 2013.

42 "India Test-Fires Canister-Launched Agni 5 Missile," *HIS Jane's 360*, February 1, 2015.

43 Tien-sze Fang, *Asymmetrical Threat Perceptions in India-China Relations*, New Delhi: Oxford University Press, 2014; Susan L. Shirk, "One-Sided Rivalry: China's Perceptions and Policies Toward India," in Francine R. Frankel and Harry Harding, eds., *The India-China Relationship: What the United States Needs to Know*, New York: Cornell University Press, 2004. See also John W. Garver, "Asymmetrical Indian and Chinese Mutual Threat Perceptions," *Journal of Strategic Studies*, Vol. 25, No. 4, 2002, pp. 109–134; Saalman, 2012, pp. 38–43.

in 2005. In keeping with the Chinese tendency to emphasize nuclear policy rather than capabilities and India's articulation and maintenance of a no-first-use policy, the discussion of Indian nuclear and missile programs in China has been muted.[44] To the extent that less-authoritative writings have addressed the issue of Indian capabilities, they are often dismissive in tone.[45]

There are some indicators, albeit subtle ones, of change in authoritative Chinese statements on India, as well as increased Chinese discussion of India in track 1.5 nuclear discussions. In the 2013 version of *Science of Military Strategy*, the nuclear security situation facing China is described as increasingly complex.[46] In that discussion, the development of nuclear programs in countries on China's periphery is listed immediately after changes to U.S. strategic forces and strategy. The development of Indian nuclear forces is described as "particularly rapid."[47] Harder to evaluate, but of potentially greater significance, may be the suggestion in China's 2013 defense white paper that "China's armed forces . . . make overall and coordinated plans to promote military preparedness in *all strategic directions*."[48] This "all azimuths" formulation may carry significant, if implicit, implications for China's thinking regarding India and Russia.

At the popular level, China's understanding of India has been influenced by the commercialization of Chinese media and the proliferation of outlets. Much of the coverage is derivative, consisting of Chinese reporting on foreign news stories. Nevertheless, this coverage exposes readers to new perspectives—and, specifically, to the sense of strategic rivalry felt on the Indian side. One recent report cites a SIPRI expert who speculated that India's nuclear-weapon programs are aimed primarily at China, rather than Pakistan.[49] Another report knits together observations from Indian, Canadian, U.S., Russian, and Japanese sources to suggest India might consider using nuclear missiles to strike the Three Gorges Dam.[50] And in December 2015, the Chinese-language *Global Times* summarized a report from Yahoo News on a secret "nuclear city" in

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44 Interview, Beijing, May 19, 2014. Having tested nuclear devices in 1998, the Indian government established a National Security Advisory Board. On August 17, 1999, the board drafted a report on nuclear doctrine that established a no-first-use policy and a policy of "credible minimum nuclear deterrence." See Arms Control Association, "India's Draft Nuclear Doctrine," webpage, July 1, 1999; and "The National Security Advisory Doctrine," *India News*, October 1, 1999.

45 李智 [Li Zhi], ed., 〈印度将追加 '维克兰特' 号建造费 或圆航母国产梦〉 ["India Will Increaase Funding for 'Vikrant' Construction, May Achieve the Dream of Domestically Produced Aircraft Carrier"], China Network, July 17, 2014.

46 Shou Xiaosong, 2013.

47 Shou Xiaosong, 2013, p. 171.

48 State Council Information Office, 2013; emphasis added.

49 〈瑞典智库: 印度核武器针对中国而非巴基斯坦〉 ["Swedish Think Tank: Indian Nuclear Weapons Are Against China, not Pakistan"], Huanqiu Net, September 28, 2009.

50 〈中国防空火力密布三峡 防印度核武〉 ["China's Air Defense Firepower Densely Deployed Around Three Gorges Against Indian Nuclear Weapons"], 中国时刻 [China Time Network], August 6, 2013.

southern India designed to supply enriched uranium for use in hydrogen bombs. The article cited several Indian and Western officials who discussed India's motives for the hydrogen program primarily in terms of deterring China.[51]

Chinese academics and military commentators have made similar points. In the past, Chinese analysts generally described Indian rhetoric on the "China threat" as an instrumental justification for Indian military programs. More recently, however, some leading India experts in China warn that the discussion of the China threat in India has a long history and is a real motivator and planning factor. Fudan University's Zhang Jiegen has argued that, "Although Sino-Indian relations have made enormous progress in recent years, Indians still view China as a strategic competitor. . . . And this is even more the case in nuclear strategy."[52] Others view Indian nuclear motivations as mixed, partly driven by insecurity vis-à-vis China but also by a desire for great-power status.[53] Rear Admiral (retired) Yin Zhuo, a popular military commentator, stated that India's emphasis on developing its military nuclear power could affect the strategic balance in Asia, particularly if India aligned with the United States.[54]

Both Chinese media and the expert community closely followed India's April 19, 2012, test firing of the Agni-5 ICBM, dubbed by Indian media as the "China killer." Two analysts with the Nanjing Army Command Institute concluded that the Agni-5 test was an "important milestone" in India's development of a land-based nuclear deterrent and illustrated India's desire for a "seat at the table" with the United States, Russia, and China. They also saw the test as an effort to "counterbalance" China's nuclear forces.[55] An article from the China Academy of Military Sciences suggested the test was proof that India was "making up for deficiencies in Indian long-range ballistic missile development" and was a "first step" in realizing a "real combat capability and deterrent."[56] Technical analyses in Chinese defense journals concluded that the mis-

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51 〈美媒: 印度秘密建造 '核城市' 追赶中国核武伐〉 ["U.S. Media: India Builds a Secret 'Nuclear City' to Close China's Nuclear Advantage"], 《环球时报》 [*Global Times*], December 18, 2015.

52 章节根 [Zhang Jiegen], 《印度核战略对中国安全环境及南亚政策的影响》 [*Impact of Indian Nuclear Strategy on China's Strategy Environment and its Policies Toward South Asia*], 复旦大学国际问题研究院 [Shanghai: Institute of International Studies, Fudan University], April 2011. See also Ming Zhang, *China's Changing Nuclear Posture,* Washington, D.C.: Carnegie Endowment for International Peace, 1999.

53 Xiaoping Yang, 2016.

54 〈专家: 印度核力量将打破亚太平衡 配合美日遏华〉 ["Expert: India's Nuclear Strength Could Destroy the Asia-Pacific Balance and Facilitate the U.S. Containment of China"], Xinhua, February 18, 2014.

55 Wang Tao and Liu Yonghong, 〈从 '烈火5' 试射透视印度 '导弹强国' 思想〉 ["A Perspective on the Thinking of Becoming a 'Strong Missile Power' from India's Test of the Agni-V Missile"], 《国防科技》 [*National Defense Science & Technology*], Vol. 5, 2012.

56 军事科学院 [Academy of Military Sciences], 〈烈火走向实战尚需时日〉 ["Agni Not Yet Combat Capabile"], *Jiefangjun Bao*, September 22, 2013.

sile achieved initial success in hitting its target, thereby illustrating India's "new and improved" strategic nuclear deterrent.[57]

The rapid development of Indian nuclear forces and the evolving Chinese reporting on India-related security issues raise three important questions. First, will China accept Indian parity in the nuclear realm? Historically, Beijing has accepted demonstrable U.S. and Russian nuclear superiority, and China's standards for nuclear sufficiency do not differentiate potential opponents. Yet a number of considerations nevertheless make the question salient. China's 1964 test came when the United States and Russia already had an effectively unassailable lead in nuclear weapons. India's 1998 test, on the other hand, came some 34 years after China's first test. Research on cognition suggests that individuals are far more reluctant to surrender assets (such as advantages) already in hand than they are to forgo gaining something they currently lack, and such logic could produce a differentiated Chinese view of its positions vis-à-vis the United States and Russia on the one hand and India on the other.[58]

China's historically dismissive attitude toward Indian power and capabilities could deepen Chinese reluctance to surrender current nuclear advantages. Chinese writings tend to place India on a different plane from not only the United States and Russia but also China. Although Chinese sources categorize both China and India as emerging powers, they are quick to highlight India's shortcomings. U.S. academic Susan Shirk states flatly that China "simply does not take India seriously."[59] Chinese specialists see India is seen as having a host of structural economic disadvantages, many caused by what Chinese observers see as its weak or immature democratic structures. And although Chinese strategists note Indian military advances, they often describe its technology, such as that embedded in its newly launched SSBN, as primitive or derivative.[60]

Perhaps as a consequence, when India has demonstrated technical prowess that may rival or exceed China's, the advances have come as a shock to the Chinese scientific community, prompting a determination to match or better India.[61] Examples Chinese interlocutors have cited include the deployment of seven satellites by a single

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57 Fang Youpei, Chen Liling, Wang Liping, and Cai Yamei, 〈印度烈火弹道导弹突防能力分析〉 ["Penetration Ability Analysis of Indian Agni Ballistic Missile"], 《航天电子对抗》 [*Aerospace Electronic Warfare*], Vol. 29, No. 1, 2013.

58 For a discussion of prospect theory application in political science, see Rose McDermott, "Prospect Theory in Political Science: Gains and Losses From the First Decade," *Political Psychology*, Vol. 25, No. 2, 2004.

59 Shirk, 2004.

60 See, for example "Expert: India's Nuclear Strength Could Destroy . . . ," 2014. On India's nuclear capabilities more generally, see 罗琪 [Luo Qi], 〈印度核力量难敌中国:中国对印度有"三大优势〉 ["Indian Nuclear Capabilities Face Difficulties Challenging China: China's 'Three Large Advantages' vs. India"], 《世界新闻报》 [*News of the World*], July 20, 2010.

61 Interview with Chinese strategist, Beijing, May 2014.

booster and the employment of advanced gas centrifuges for uranium enrichment.[62] The entry of India's Mars Orbiter Mission into Mars orbit in September 2014 prompted a half-page spread in the overseas edition of the *People's Daily* on India's "Great Power Dream." The article acknowledged India's technological progress but also singled India out for responsibility in the continuing India-Pakistan nuclear arms competition. It suggested that many Indians have been unable to move beyond the 1962 war and argued that India's technological development is excessively weighted toward military achievement.[63]

Asked point blank whether or not China would accept Indian nuclear parity, some of the Chinese experts we interviewed expressed doubt that it would. Moreover, some analysts also believe that India may in fact be pursuing that goal.[64] In December 2016 and January 2017, India conducted back-to-back tests of the Agni-4 and Agni-5 missile systems, with the domestic Indian media proclaiming India's ability to strike targets throughout China. In the most direct official response to Indian strategic tests to date, Foreign Ministry spokesman Hua Chunying noted the tests and suggested that they ran contrary to UN Security Council regulations "on whether India can develop ballistic missiles capable of carrying nuclear weapons."[65] China's *Global Times* ran an article urging India to "cool its missile fever" and suggested that, if Western countries turned a blind eye toward India's nuclear development, China would not "stick rigidly" to "nuclear rules." "Pakistan should," it continued, "have those privileges in nuclear development that India has."[66] One Indian analyst speculates that China's response was, in part, informed by a fear that the United States was setting India up as a nuclear rival and abetting an Indian desire for strategic parity.[67]

A second question is whether Chinese doctrine will be influenced by Indian nuclear developments, especially if the latter abandons its no-first-use doctrine or, more

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62 On Indian satellite deployment, see William Graham, "Indian PSLV Successfully Lofts Multiple Satellites," NASA Spaceflight website, February 25, 2013.

63 严 瑜 [Yan Yu], 〈科技催胀印度 '大国梦'〉 ["Science and Technology Inflate India's 'Great Power Dream'"], 《人民日报海外版》 [*People's Daily Overseas Edition*], September 27, 2014. When India launched the orbiter in December 2013, Chinese commentary initially focused on the limitations of India's space program and the inadvisability of interplanetary travel while India's satellite program for earth observation remains weak.

64 The Chinese Academy of Military Science's Du Wenlong, for example, argues that India is using the Agni-5 to achieve strategic parity and that it is seeking to transform itself from a regional military power to a major global military power.; see 〈专家: 印度欲借烈火5导弹谋求与中国战略平等对话〉 ["Specialist: India Wants to Use the Agni-5 Missile to Seek Strategic Parity Dialogue with China"], China National Radio, September 18, 2013.

65 Foreign Ministry Spokesperson Hua Chunying's Regular Press Conference on December 27, 2016. The reference is apparently to UN Security Resolution 1172 (adopted in June 1998), which called on both India and Pakistan to cease the development of nuclear and nuclear-capable missile capabilities. It was approved under Chapter VI of the UN Charter and is therefore nonbinding.

66 "India Needs to Cool Its Missile Fever," *Global Times*, January 4, 2017. The same content appeared in the Chinese-language version of the newspaper.

67 "Why India's Nuclear Missile Tests Are Giving Sleepless Nights to China," *DailyO*, January 11, 2017.

likely, develops nuclear warfighting capabilities without officially changing doctrinal labels. Given the current trajectory of Indian research and development, it appears that Indian leaders would have to make an active political decision to halt the progression toward such capabilities. Should India deploy a broad range of warfighting capabilities, Chinese military planners might fear that China could potentially face an Indian foe capable of using nuclear weapons to win battlefield victories. Just as Pakistan's commitment to the battlefield use of nuclear weapons pressures India to find a flexible response, India's development of warfighting capabilities could encourage China to embark down a similar path.

A third question is what impact the budding Indian strategic relationships with the United States and, to a lesser extent, Japan might have on the Chinese view of India's nuclear and missile programs. The U.S.-India Defense Technology and Trade Initiative, launched in 2012, is designed to mitigate bureaucratic hurdles in defense-industrial cooperation. The initiative was further developed in 2015 with the ten-year Framework for the U.S.-India Defense Relationship.[68] If Chinese views on Indian nuclear issues are shaped in part by how analysts assess the purported low quality of Indian military systems, the new framework for technology transfer may prompt a degree of reconsideration about the potential challenge from India. At the same time, the Joint Strategic Vision for the Asia-Pacific and Indian Ocean Region (signed in 2015) and other signs of broader U.S.-Indian strategic cooperation may raise doubts about India's broader international direction.[69] As Chinese researcher Yang Xiaoping wrote, "All these [U.S.-India] initiatives support India's greater power aspirations and also make India more technically capable."[70]

Although China has long belittled Indian military capabilities and underestimated New Delhi's suspicion of China, that is now changing. To some extent, this change is being driven by the commercialization of the media and access to a far wider range of information, but it also reflects a new appreciation of India in authoritative sources. Indian nuclear capabilities are improving rapidly, and both the relative numerical and technological gaps are narrowing. India is currently pursuing technological capabilities that may go beyond those strictly required for a minimum credible nuclear deterrent and may eventually give it some limited nuclear warfighting capabilities. And New Delhi's budding strategic relationship with Washington suggests an evolving Indian political calculus. All these developments have caught China's attention and could prompt it to redouble its efforts and rethink its requirements.

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68 Council on Foreign Relations, "U.S.-India Defense Framework," June 3, 2015.

69 Nirmala Ganapathy, "India and the US 'Vision' for Asia Pacific and Indian Ocean Seen as 'Counter' to China," *The Straits Times*, January 26, 2015.

70 Xiaoping Yang, 2016.

China's North Korea Problem

Beijing's relationship with the Democratic People's Republic of Korea (DPRK) is complex and growing more so over time. China and North Korea have long maintained ostensibly close relations, with a bond forged in blood after the Chinese People's Volunteer Army took up arms alongside the Korean People's Army in 1950. According to the Sino-North Korea Treaty of Friendship, Co-operation and Mutual Assistance, should North Korea come under attack, China must "render military and other assistance by all means at its disposal."[71] Decades after the Korean War, China is North Korea's most important trading partner and a critical source of economic and food aid.[72] Beijing may have little affinity for Pyongyang but fears disorder in North Korea and the possibility of increased refugee flows into China. It has, therefore, routinely come to Pyongyang's defense in the international political arena, often using its clout in such organizations as the UN to prevent or minimize sanctions against North Korea.[73]

Yet while China's leaders have historically been tolerant of North Korean misbehavior, Beijing is growing increasingly wary of its neighbor to the northeast. In recent years, Chinese academics and intellectuals have been allowed to comment on and criticize the DPRK openly.[74] Mandarin-language social media services, such as Sina Weibo, have permitted comments openly critical of North Korea and Kim Jong-un to be posted unfiltered.[75] Despite China's past reluctance on sanctions, it has nevertheless approved increasingly stringent UN sanctions in June 2009, January 2013, and March 2016. Following North Korea's fifth nuclear test in September 2016, the Chi-

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71 Treaty of Friendship, Co-operation and Mutual Assistance Between the People's Republic of China and the Democratic People's Republic of Korea, July 11, 1961.

72 Mark E. Manyin and Mary Beth D. Nikitin, *Foreign Assistance to North Korea*, Washington, D.C.: Congressional Research Service, R40095, April 2, 2014. Despite North Korea's relative economic unimportance to China, trade with China makes up roughly 60 percent of total North Korean trade. Moreover, North Korea's massive trade deficit with China, coupled with Pyongyang's inability to finance it through borrowing, has led some experts to argue that this trade deficit is essentially an indirect subsidy. See Emma Chanlett-Avery and Ian E. Rinehart, *North Korea: U.S. Relations, Nuclear Diplomacy, and Internal Situation*, Washington, D.C.: Congressional Research Service, R41259, January 15, 2014, and Scott Snyder, "China-Korea Relations: Pyongyang Tests Beijing's Patience," *Comparative Connections*, July 2009.

73 This international political support has traditionally spanned both security and human rights issues. See, for example, Malcolm Moore, "China Rejects UN Criticism on North Korea," *Telegraph*, February 18, 2014.

74 One example of critical commentary by a major Chinese foreign relations expert is Shen Dingli, "Lips and Teeth," *Foreign Policy*, February 13, 2013a. It is worth noting, however, that commentators have not received carte blanche to advocate extreme positions. When Deng Yuwen, editor at a major Communist Party journal, wrote a *Financial Times* piece calling for China to abandon North Korea as an ally entirely, he soon found himself out of work (Jane Perlez, "Chinese Editor Suspended for Article on North Korea," *New York Times*, April 1, 2013).

75 Kerry Allen, "China's Patience with 'Kim the Fat' Wears Thin After H-Bomb Test," BBC News, January 8, 2016.

nese Foreign Ministry declared that it "resolutely opposes" Pyongyang's actions.[76] And in contrast to China's apparently lax enforcement of the past, the Liaoning Provincial government announced shortly after the September 2016 test that it was investigating a Chinese conglomerate for "serious economic crimes" related to possible violations of sanctions.[77]

Despite some change in attitude and rhetoric, there may be limits in how far Beijing is willing to go to dissuade Pyongyang from pursuing its nuclear and missile programs.[78] In Beijing's view, North Korea remains a valuable strategic buffer against the United States and South Korea. More important, the Chinese prioritize stability on the Korean Peninsula above all other values there—including denuclearization—and fear that, if pushed too hard, North Korea could become unstable.[79] Even after numerous North Korean nuclear tests, Beijing continues to apportion responsibility to South Korea and the United States, as well as North Korea, and continues to emphasize the need for restraint. In March 2014, Foreign Minister Wang Yi told reporters: "The Korean peninsula is right on China's doorstep. We have a redline, that is, we will not allow war or instability on the Korean peninsula."[80]

Although North Korea has nuclear weapons and shares a border with northeast China, Beijing appears to sense no direct threat to its own security from that quarter, despite the North's growing nuclear and nuclear capability (see Table 6.2). Indeed, two recent Chinese defense white papers list security threats as diverse as strengthened American alliances in the Asia-Pacific region; Japanese territorial claims; the "three forces" of terrorism, separatism, and extremism; Taiwanese independence; and natural disasters—without even mentioning North Korea and its nuclear capabilities.[81] Similarly, the 2013 *Science of Military Strategy* provides only cursory comments on North Korea, none of which suggest a direct threat from it: "Entering the 21st century, the

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[76] Ministry of Foreign Affairs of the People's Republic of China, 〈2016年9月9日外交部发言人华春莹主持例行记者会议〉 ["Foreign Ministry Spokesman Hua Chunying Holds Press Conference on September 9, 2016"], September 9, 2016.

[77] Jane Perlez and Chris Buckley, "China Announces Inquiry into Company Trading with North Korea," *New York Times*, September 20, 2016.

[78] Andrew Scobell and Mark Cozad, "China's North Korea Policy: Rethink or Recharge?" *Parameters*, Vol. 44, No. 1, Spring 2014.

[79] Stephanie T. Kleine-Ahlbrandt, Director of Asia-Pacific, United States Institute of Peace, "Testimony Before the U.S.-China Economic and Security Review Commission: Hearing on China's Relations with North Korea," June 5, 2014; Stephanie Kleine-Ahlbrandt, "China's North Korea Policy: Backtracking from Sunnylands?" 38 North website, July 2, 2013.

[80] Michael Martina and Ben Blanchard, "China Draws 'Red Line' on North Korea, Says Won't Allow War on Peninsula," Reuters, March 8, 2014.

[81] State Council Information Office, 2015; State Council Information Office, 2013.

Table 6.2
North Korean Ballistic Missile Forces

System	Launchers (number)	Estimated Range (miles)
Toksa	<100	75
Scud-B	<100	185
Scud-C	<100	310
Scud-ER	<100	435–625
No Dong	<50	800
IRBM	<50	>2,000
TD-2	Unknown	>3,400
SLBM	At least 1	Unknown
KN08	At least 6	>3,400

SOURCE: OSD, *Military and Security Developments Involving the Democratic People's Republic of Korea 2015*, January 2016b, p. 19.

North Korean nuclear issue has continued to ferment, and the likelihood that the problem will resolve completely within the short term is very small."[82]

Instead, China's concerns about the DPRK's nuclear program stem almost entirely from other regional actors' responses to North Korea's development of the weapons. Chinese leaders have long been concerned that aggressive U.S. responses to nuclear provocation could cause greater instability on the Korean peninsula. This fear was on full display during the ongoing nuclear crisis in 2003, when China took unprecedented diplomatic action to establish the Six-Party Talks, a move that many analysts believe was driven by Beijing's fear of what the United States might do if Pyongyang's nuclear posturing continued unchecked.[83] More recently, China has exerted pressure on North Korea to back off from nuclear and ballistic missile tests in the wake of American B-2 and B-52 "show of force" flights over South Korea that Beijing feared could spark a larger crisis.[84]

Beijing also fears that the United States and its regional allies are exploiting the North Korean nuclear issue to advance their own interests. China has made no secret of its concerns about TMD, and there is some debate within China about whether the United States is deploying THAAD and other systems in response to nuclear and mis-

[82] Shou Xiaosong, 2013, p. 171.

[83] Andrew Scobell, *China and North Korea: From Comrades-in-Arms to Allies at Arm's Length*, Carlisle, Pa.: Strategic Studies Institute, U.S. Army War College, March 2004, pp. 12–13.

[84] Kleine-Ahlbrandt, 2013.

sile developments in North Korea or is simply using these developments as an excuse.[85] While China does acknowledge that the United States, Japan, and South Korea have legitimate concerns about Pyongyang's nuclear and missile programs, mainstream Chinese military analysts frequently argue that the United States and its allies are simply using North Korea's behavior as an excuse to install missile defense systems aimed at China.[86] In February 2016, Chinese Foreign Minister Wang Yi indicated, "China is deeply concerned that the United States may deploy the THAAD missile defense system to Korea, and China resolutely opposes any country borrowing the nuclear problem on the peninsula to damage China's rightful national interests."[87]

Regardless of the extent to which they believe U.S. explanations about TMD, some Chinese analysts nevertheless stipulate that North Korea's nuclear and missile programs are doing significant harm to China's international position—leading Japan to remilitarize, South Korea to enter the U.S. orbit more fully, and U.S. allies to join with the United States in deploying missile defenses.[88] More broadly, developments in North Korea contribute to the Chinese view that the international nuclear security environment is growing more complex and challenging for Beijing, even though there is presently no direct sense of threat from Pyongyang.

China's View of Japan

In recent years, concern has increased in China over Japan's direction. Chinese strategists see Japanese foreign policy as becoming "more extreme on such issues as its recognition of history, its constitutional amendment policy and various territorial disputes with neighboring countries."[89] China's 2013 defense white paper explicitly singled out Japan as "making trouble" over the Senkaku/Diaoyu Islands, while the 2015 white paper claims, "Japan is sparing no effort to dodge the post-war mechanism, overhauling its military and security policies."[90] Chinese analysts note that Japan sees China as

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85 For more on Chinese uneasiness over missile defense programs, see the "Chinese Perceptions of U.S. Nuclear Posture" section earlier in this chapter.

86 Chen Zhou, "Anti-Ballistic Missile Program: Does No Good to World Peace and Security," *China-US Focus*, August 24, 2012.

87 〈中国极力反对的美国'萨德系统'究竟是什么?〉["Why Does China Strenuously Oppose the U.S. THAAD System?"], 环球网 [Global News Net], July 8, 2016.

88 Chen Yue, "Commentary: Why Does U.S. Add Fuel to Fire in Korea Peninsula?" *China Military Online*, May 17, 2013; "Why Does China Strenuously Oppose . . . ?" 2016.

89 Zhang Yaohua, "Japan in 2012: Intensifying Right-Leaning Politics," in *The CIIS Blue Book on International Situation and China's Foreign Affairs*, Beijing: World Affairs Press, 2013, p. 75.

90 State Council Information Office, 2013; State Council Information Office, 2015.

its main potential security threat.[91] With Chinese military activities in the East China Sea (including transits of Japan's Miyako Strait) on the rise and with Japan increasing defense spending in an effort to remain militarily competitive, suspicion and recrimination continue to characterize the relationship in 2017—despite diplomatic efforts to mitigate tensions.[92]

On the nuclear side, Chinese analysts view Japanese missile defense efforts as destabilizing and aimed at not only North Korea but also China. China is also cautious of Japan's latent nuclear capabilities and is worried that barriers preventing Japan from seeking nuclear weapons may be eroding.

Japanese Missile Defense

Japan has been building a BMD system since 2003. It currently deploys a two-tiered system: Aegis ship-launched SM-3 missiles for midcourse interception and ground-based Patriot Advanced Capability–3 (PAC-3) surface-to-air missiles for terminal interception. Japan has fielded six Aegis BMD ships, PAC-3 units for six Air Defense Missile Groups, four FPS-5 fixed air-defense radars, and seven upgraded FPS-3 radars.[93] It is building the first of two additional Aegis-equipped BMD ships and is deploying its new FPS-7 radar.[94] Japan is also considering two additional elements to its current missile defense system: a THAAD system and ground-based SM-3 interceptors.[95]

Japan is also the closest U.S. regional partner in missile defense.[96] Japan has been working with the United States toward a Northeast Asia TBM defense system. This will involve real-time sharing of intelligence, as well as joint training and other activities. To facilitate cooperation, the United States has forward deployed a number of assets: Aegis BMD ships to Yokosuka naval base since 2006, PAC-3 units to Kadena Air Base since 2006, a Joint Tactical Ground Station at Misawa Air Base since 2007, and two

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[91] According to the 2013 *Science of Military Strategy*, countries that Japan has traditionally viewed as potential adversaries in the post–Cold War era (ranked in order of threat) were North Korea, China, and Russia. Recently, the text writes, Japan is focused more on growing Chinese power and military capabilities. Shou Xiaosong, 2013, p. 63.

[92] For example, the release of the 2016 Defense of Japan white paper, for example, saw spokesmen for both sides criticizing both the military activities and rhetoric of the other side (〈国防部新闻发言人吴谦就日本发表2016年版'防卫白皮书'发表谈话〉 ["Chinese MoD Spokesman Wu Qian Discusses Japan's Release of its 2016 Defense White Paper"], Xinhua, August 2, 2016).

[93] International Institute for Strategic Studies, *The Military Balance*, 2016; Ministry of Defense, *Japan's BMD Update,* Tokyo: March 19, 2014c.

[94] Ministry of Defense, *Defense Programs and Budget of Japan: Overview of FY2016 Budget*, Tokyo, 2016.

[95] Julian Ryall, Gabriel Dominguez, and Neil Gibson, "Japan Considers Adding THAAD to Its Air Defence Capabilities," *IHS Jane's 360*, August 12, 2016; "Defense Ministry to Study New Missile Defense Systems," *Japan Times,* June 21, 2014.

[96] U.S. efforts to work with South Korea on missile defense has encountered a number of obstacles (Karen Montague, *A Review of South Korean Missile Defense Programs*, Arlington, Va.: George C. Marshall Institute, March 2014).

AN/TYP-2 radar systems. Since 2006, Japan and the United States have been jointly developing an advanced BMD interceptor missile (SM-3 block IIA). As of December 2015, the interceptor had undergone two live-fire tests.[97] It will have improved maneuverability, intercept capability, range, and reliability in target detection.[98] In addition to serving in Japan, it will also be the centerpiece of European missile defense.

Chinese experts track Japanese and U.S.-Japanese missile defense efforts closely.[99] They see these efforts as targeting China, as well as North Korea, and have several concerns. First, these experts fear that future advances in Japanese (and U.S.) sea-based missile defense system could undercut China's nuclear retaliatory capability. Chinese experts believe future SM-3 variants could, if deployed near China's shores or close to the United States, have some capability to intercept Chinese ICBMs. If applied to U.S. homeland defense, this could provide the United States with the space necessary for a shoot-look-shoot doctrine, which would greatly increase the effectiveness of missile defenses. Japan's intelligence sharing with the United States, as well as U.S. radars and other assets positioned in Japan, would also increase the effectiveness of U.S. homeland missile defense by improving the tracking of Chinese missile trajectories.[100]

Second, there is concern that missile defense efforts could contribute to the development of technologies (such as command, control, communications, computers, and ISR systems) that would be useful in developing offensive ballistic missile forces, should Japan decide to pursue a long-range strike capability. Japan has shown interest in long-range strike. Japanese officials reportedly wanted to include discussions of Japanese strike options in the negotiations over the 2015 Guidelines for U.S.-Japan Defense Cooperation.[101] (The U.S. side demurred.) And in August 2014, a new Air Tactics Development Wing was established within the Air Defense Command and was tasked

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97 U.S. Missile Defense Agency, 2015.

98 Ministry of Defense, "Efficient Deterrence and Response," in *Defense of Japan 2014,* Tokyo, 2014b, Pt. III, Ch. 1, Sec. 1; Ministry of Defense, 2014c. See also "Strategic Capabilities of SM-3 Block IIA Interceptors," Mostly Missile Defense blog, June 30, 2016.

99 See, for example, 雷宇曜 姜文志 刘敬蜀 张声 [Lei Yuyao, Jiang Wenzhi, Liu Jiangshu, and Zhang Sheng], 〈日本防空反导导弹系统探析〉 ["Analysis of Japan's Air Defense Missile Defense System"], 《飞航导弹》 [*Aerodynamic Missile Journal*], Vol. 1, 2014; 李梅 [Li Mei], 〈美国西太平洋地区导弹防御系统建设情况分析〉 ["Assessment of the Construction of U.S. Missile Defense System in the Western Pacific Region"], *National Defense*, No. 6, 2013; 孟杰 张弓胤 [Meng Jie and Zhang Gongyin], 〈日本海上自卫队反导作战能力分析〉 ["Analysis of Japan's Maritime Self-Defense Force's Anti-Ballistic Missile Warfighting Capability"], 《飞航导弹》 [*Aerodynamic Missile Journal*], No. 2, 2013; 兰子诺 [Lan Zinuo], 〈近年日美导弹防御合作新动向〉 ["New Directions in U.S.-Japan Missile Defense Cooperation"], 《国际资料信息》 [*International Data Information*], Vol. 8, 2011.

100 Twomey and Chase, 2015; Wu Riqiang, "China's Anxiety About U.S. Missile Defence: A Solution," *Survival*, Vol. 55, No. 5, October–November 2013.

101 "日本の'敵基地攻撃能力'保有、米国と水面下のせめぎ合い" ["Behind the Scenes Disagreement with U.S. over Japan's Development of Capabilities to Strike Enemy Bases"], Reuters, September 10, 2014.

(in part) with studying the strike problem.[102] If Japan decided to manufacture nuclear weapons, such capabilities could evolve into delivery systems.[103]

Third, Chinese strategists see U.S.-Japanese missile defense cooperation as strengthening the U.S.-Japan alliance. Closer cooperation with the United States may encourage Japan to take a higher profile in regional crises over North Korea or Taiwan, and bolder Japanese action could, they believe, exacerbate existing tensions.[104] One expert raised the possibility that Aegis BMD ships could provide Tokyo with greater ability to deploy assets forward and intervene in affairs abroad.[105] Another noted that a stronger U.S.-Japan alliance and U.S. nuclear extended deterrence could provide Japan with more leeway to engage in lower-level conventional conflict because Japan might reason that the U.S. nuclear deterrent would prevent adversaries from engaging in large-scale conventional retaliation.[106]

Finally, Chinese analysts worry that Japanese development of missile defense could lead to proliferation and a regional arms race. Some, for example, have observed that North Korea may respond to Japanese and U.S. TMD by expanding the size and sophistication of its missile force to penetrate defenses.[107]

Japanese Latent Nuclear Capabilities

Along with concerns over Japanese missile defense, China has also been increasingly vocal in its criticism of Japan's latent nuclear weapon capability. China is well aware that Japan is technically capable of manufacturing nuclear weapons and delivery vehicles and also has sufficient nuclear materials. As of early 2016, Japan had 47.9 tons of separated reactor-grade plutonium, of which 10.8 tons were held domestically and the rest abroad.[108] Several hundred kilograms of this material are being shipped to the

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[102] The Air Tactics Development Wing brought existing research and instructional groups under one umbrella and also examines options for defeating electronic warfare and modern air defenses ("空自が研究センター新設" ["JASDF Research Center Established"], *Sankei Shimbun* online, August 1, 2014; "空自に今夏'航空戦準術団' 敵基地攻撃能力を研究" ["JASDF (to Establish) Air Tactics Development Wing to Study Offensive Potential Against Enemy Airbases This Summer"], *Sankei Shimbun* online, January 3, 2014).

[103] 吴心伯 [Wu Xinbo], 〈日本与东北亚战区导弹防御〉 ["Japan and TMD in Northeast Asia"], 《国际问题研究》 [*China International Studies*], Vol. 5, 2003, p. 47.

[104] Wu Xinbo, 2003, p. 47.

[105] Dai Yanli and Cheng Min, 〈日本 '宙斯盾' 反导弹系统的发展, 动因与影响〉["Japan's Aegis Ballistic Missile Defense System's Development, Drivers, and Influence"], 《外国军事学术》 [*Foreign Military Studies*], Vol. 7, 2007.

[106] Li Bin and Yun He, "Credible Limitations: U.S. Extended Nuclear Deterrence and Stability in Northeast Asia," in Rory Medcalf and Fiona Cunningham, eds., *Disarming Doubt*, Australia: Lowry Institute, 2012.

[107] Dai Yanli and Cheng Min, 2007, p. 47.

[108] Office of Atomic Energy Policy (Japan), "The Status Report of Plutonium Management in Japan—2015," July 27, 2016.

United States for disposal.[109] But Japan continues to work toward opening a reprocessing facility at Rokkasho that could separate roughly 8 tons of plutonium a year—enough material for more than 2,000 nuclear warheads.[110] A China Central Television (CCTV) report suggests that, should Japan decide on nuclear weapons, Japan would immediately become the world's third-largest nuclear power.[111] And while there is no indication that the Chinese government believes that Japan is currently manufacturing nuclear weapons, there is concern that Japan may be keeping more nuclear material than necessary for domestic energy use.

In recent years, Chinese analysts have repeatedly suggested that Japan is continuously using small steps to chip away barriers preventing its nuclearization.[112] Chinese articles cite a number of Japanese developments confirming this trend, including the following:

- moves to reinterpret Japan's constitution, modification of its Atomic Energy Basic Law to allow nuclear energy to be used for "national security"[113]
- passage of a State Secrets Law that restricts information related to national defense[114]
- greater accumulation of nuclear material[115]
- continued construction of the Rokkasho nuclear reprocessing plant.[116]

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109 "Japan to Send Weapons Grade Plutonium Back to U.S. This Weekend, Greenpeace Says," Reuters, March 18, 2016.

110 "Japan Producing Huge, Lightly Guarded Stockpile of Plutonium," NBC News, April 27, 2014.

111 See〈日本核武迷局〉["Japan's 'Nuclear Weapon' Puzzle"], video, CCTV Channel 13, March 6, 2014. The same report noted that Japan has advanced computer modeling and simulation capabilities that can "test" nuclear weapons without physically detonating a device.

112〈'核武梦' 将给日本带来灾难〉["'Nuclear Weapons Dream' Will Bring Japan Disaster"],《解放军报》, *PLA Daily*, February 28, 2014, p. 7.

113〈重启核电站, 日本欲何为?〉["Restarting Nuclear Reactors, What Is Japan Trying to Do?"], Xinhua, March 20, 2013;〈韩媒: 日本修改原子能法意在牵制中国〉["South Korean Media: Japan Amends Atomic Energy Basic Law to Counter China"],《参考消息网》[*Cankao Xiaoxi*], June 24, 2012.

114〈日本执政党强行表决通过保密法案〉["Japan's Governing Party Forced Through State Secrets Law"], Xinhua, December 7, 2013.

115 伍钧, 孙向丽 [Wu Jun and Sun Xiangli],〈日本累计核材料令东亚安全蒙忧〉["Japan's Accumulation of Nuclear Material Causes Concerns for East Asian Security"], Xinhua, February 21, 2014.

116 Japan's Rokkasho reprocessing facility, which could commence operations in 2016, has "an annual throughput of 800 tons of spent fuel containing one percent plutonium." The significant amount of plutonium reprocessed by the facility makes it difficult for the International Atomic Energy Agency to monitor diversions of nuclear material from the facility. See Alan J. Kuperman, David Sokolow, and Edwin S. Lyman, "Can the IAEA Safeguard Fuel-Cycle Facilities?" Austin: University of Texas, Nuclear Proliferation Prevent Project Working Paper 2, 2014, p. 22.

From China's perspective, Japanese participation in TMD is an immediate problem, closely tied to the credibility of China's nuclear deterrent and to issues of nuclear sufficiency. Chinese analysts do not appear to believe that deployed missile defense capabilities already in place compromise China's retaliatory capability. But it would not be unreasonable to presume, given the language of many Chinese statements, that possible future developments in Japanese TMD may already be a planning factor in China. Japan's latent nuclear capabilities fall into a separate category and are, like considerations related to North Korea, an issue that affects the nature of the international global environment, rather than an immediate issue for Chinese planners.

Conclusion

China is embedded in a set of complex and nested nuclear security dilemmas. Beijing's nuclear calculations are still primarily based on an estimate of the potential threat from the United States. At the same time, several other regional countries are assuming greater prominence in Chinese nuclear thinking. The number of countries subject to China's nuclear security assessment has increased, complicating the task of fashioning a nuclear posture that supports Chinese strategic deterrence while not simultaneously setting off or exacerbating potentially costly regional arms races. China's future nuclear doctrine will partly depend on how well Beijing understands the dilemmas and dynamics attendant to nuclear politics in this environment, and the balance it strikes between competing motivations and impulses.

For all parties engaged, Asia's nested security dilemmas mean that the actions of even states that do not pose a direct threat may be problematic. North Korean nuclear developments pose security challenges for Beijing because the reactions of the United States, Japan, and South Korea may affect China's retaliatory capability. Washington may confront similar dilemmas. Potential nuclear rivalry between China and India could prompt Pakistan to increase its own nuclear efforts—and Pakistan's nuclear efforts could, in turn, increase the probability of loose nukes. Such efforts could also further impoverish the state, raising the specter of state failure.

Fortunately, although security dilemmas and insecurities exist, there is little sign of a truly multilateral arms race at present. Pakistan and India appear engaged in a nuclear arms race, and there is an action-reaction cycle apparent in U.S.-China strategic relations, but multilateral dynamics are more prospective than present. All the nuclear states of Asia will, however, have to make efforts to ensure that this remains the case. A multilateral arms race would impinge on both U.S. and Chinese interests, complicate U.S. extended deterrence, and increase political tensions throughout the region.

CHAPTER SEVEN

Internal Drivers: Political Leadership and Bureaucracy

The preceding chapters have addressed China's current nuclear trajectory and the external considerations that may shape its future direction. Assuming that the Chinese state behaves according to the rational-actor model (discussed further later), its leaders' perceptions of the external environment will play a decisive role in shaping strategic direction. However, as a number of students of international relations have observed, domestic factors may also be important in shaping outcomes; depending on the country and its circumstances, these can potentially trump external drivers.[1] In this chapter, we consider three models of national decisionmaking and how they might influence China's nuclear direction. First, we briefly evaluate the evolution of China's political governance in the context of the rational-actor model. Second, we evaluate the role of bureaucratic politics and the evolving status and influence of different bureaucratic actors (with primary attention to China's military services). Third, we assess the possible effects of organizational processes and the influence of standard operating procedures (SOPs) and bureaucratic inertia on the China's nuclear force development and

[1] The literature on the domestic sources of foreign and security policy includes works on the roles of regime type, economic interests and structures, culture, and bureaucratic influences. Most of these are associated with one or two specific aspects of state behavior. For example, regime type has been largely discussed in terms of the state's propensity for war or, alternatively, its military competence. Economic factors and the role of industry have largely been discussed in terms of how they factor into arms racing or, alternatively, the types of weapons in procurement. The literature on bureaucratic factors is most closely associated with the topics covered in this report, including both military force structure and doctrine. The literature on the domestic sources of behavior is too large to cite in any comprehensive way, but representative works covering the areas listed above include Michael W. Doyle, "Kant, Liberal Legacies, and Foreign Affairs," *Philosophy and Public Affairs*, Vol. 12, No. 3, Summer 1983; Jack Snyder, *From Voting to Violence: Democratization and Nationalist Conflict*, New York: Norton, 2000; James R. Kurth, "The Political Economy of Weapons Procurement: The Follow-on Imperative," *American Economic Review*, Vol. 62, No. 2, March 1, 1972; Eckart Kehr, *Economic Interest, Militarism and Foreign Policy*, Berkeley: University of California Press, 1977; Iain Johnston, *Cultural Realism: Strategic Culture and Grand Strategy in Chinese History*, Princeton, N.J.: Princeton University Press, 1996; Elizabeth Kier, *Imagining War: French and British Military Doctrine Between the Wars*, Princeton, N.J.: Princeton University Press, 1997; Twomey, 2010; and Graham T. Allison, *Essence of Decision: Explaining the Cuban Missile Crisis*, Boston: Little, Brown and Company, 1971.

policy.[2] These three lenses by no means exhaust the full range of policymaking models that could potentially affect nuclear options but do represent important perspectives.

China's Political Leadership and the Rational-Actor Model

To what extent has Chinese behavior in the nuclear realm been consistent with the rational-actor model, in which states behave as logical, unitary actors in response to external threats, pressures, and opportunities?[3] While we cannot definitively answer this question, we can point toward characteristics of the state that should or should not push behavior in this direction and offer some observations about real-world outcomes. A variety of factors associated with post-1949 China should work in favor of behavior consistent with the rational-actor model. But while important elements of continuity characterize decisionmaking, leadership patterns have evolved rapidly since the mid-1980s, and these changes are likely to affect the susceptibility of the state's nuclear policymaking to greater influence from bureaucratic actors with narrower interests.

China emerged from Japanese occupation and civil war with a tightly fused political and military leadership. All senior statesmen had spent decades within both the political and military hierarchies of the Communist Party. The structure of the party-led state was such that the military was tightly subordinated to political authority—a subordination symbolized by regular military professions of loyalty to the party and by the PLA's political commissar system, which placed political officers in positions of nominally equal importance to commanders. The members of the CMC, a party organ chaired by the Communist Party chairman (and, later, by the general secretary, when the position of chairman was abolished), directed most important aspects of military policy. For the first several decades after 1949, there was little interservice competition within a military that was dominated, in both name and reality, by army (or ground forces) commanders. Perhaps most important, Mao Zedong emerged from the civil

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[2] These models borrow language from and are broadly consistent with Allison, 1971, although we employ them simply to outline broad changes and their potential influence on future developments, rather than attempting any detail assessment of past or future decisions. Allison proposes three models of government decisionmaking: Model I, the rational-actor model, assumes that a government can be treated as a unitary actor rationally pursuing its goals. Model II, the organizational process model, drops the unitary actor assumption by examining how organizations within a government subdivide problems, with each organization having power over part of the solution. Model III, the governmental politics model, also discards the unitary actor assumption by examining how the leaders of different organizations within a government compete and negotiate to make decisions. We have changed the order of presentation and address the issues associated with Allison's Model II first because the balance of bureaucratic power between the services will not only affect interservice bargaining but also influence how much of an effect bureaucratic processes will have on Chinese nuclear force structure and policy.

[3] The language and ideas associated with the rational-actor model have been employed primarily to examine the assumptions associated with realist theories and to assess them alongside alternative views that see domestic factors and actors as important. Realists assume the state will behave as a unified actor in reacting to external threats and opportunities. See Allison, 1971.

war as the near universally recognized father of the new state. While his administrative leadership was challenged in the aftermath of the disastrous Great Leap Forward, he was, for most of the period between 1949 and his death in 1976, capable of setting foreign and security policy direction.

To be sure, some of the observations listed above may also challenge the rational-actor model interpretation of Chinese leadership. Nearly total army dominance of the military eliminated the potentially pernicious effects of interservice rivalry but also systematically privileged continental thinking in military policy. The political leadership was both unified and well endowed with military experience, but much of that experience was in revolutionary and guerrilla war, leading to a dismissiveness of conventional and, to some extent, nuclear capabilities on the part of many Chinese leaders.[4] Mao, for his part, was almost universally acknowledged as the leader of the revolution and given a uniquely privileged political position following that event. But there were, nevertheless, periodic political struggles that were bitter and often lethal to the losers.[5] In these struggles, Mao Zedong was willing to subordinate military policy to perceived domestic political requirements.[6]

Nevertheless, Chinese political leaders had the confidence and means to direct military policy, and Mao viewed political and military imperatives as unified in ways that would, in his own mind, produce desired outcomes in both realms. The rational-actor model does not necessarily predict "rationality" in a single objective sense but simply means that the state reacts as a unified, logical actor. Certainly, the first generation of Chinese leaders after the PRC's founding had clear views both on the unique attributes of nuclear weapons that made possessing them essential and on the limitations of their utility beyond a certain small number. These views were translated into policies that limited the scale of China's nuclear force building.

Chinese political leaders kept very immediate control of nuclear policy through a National Defense Industry Special Commission [国防工业专门委员会], often referred to as the Central Special Commission [中央专门委员会].[7] The Central Special Commis-

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4 This dismissiveness of conventional capabilities was not universal, even in the PRC's early days. Peng Dehuai, who commanded Chinese forces in Korea, advocated for the development of larger armored and air forces and greater professionalization within the military, but he was purged in 1959. On the views shaping Mao's military thought, see Prashant Kumar Singh, "Rereading Mao's Military Thought," *Strategic Analysis*, Vol. 37, No. 5, September–October 2013; see also Twomey, 2010.

5 Roderick MacFarquhar, *The Origins of the Cultural Revolution*, New York: Columbia University Press, 1997, provides a detailed, three-volume study of the politics leading up to the Cultural Revolution.

6 For this reason, Thomas W. Robinson views the period of Maoist domination as one in which foreign affairs were ruled largely by political considerations (Thomas W. Robinson, "Chinese Foreign Policy from the 1940s to the 1990s," in Thomas W. Robinson and David Shambaugh, eds., *Chinese Foreign Policy: Theory and Practice*, Oxford: Oxford University Press, 1994).

7 The Central Special Commission moniker was short for still another unofficial name for the group, the Chinese Communist Party's Central Specialist Commission of Fifteen [中共中央15人专门委员会].

sion, created in 1962 and consisting of 15 members from the political, military, and scientific communities (and headed by Premier Zhou Enlai), was tasked with coordinating nuclear weapon development.[8] There is at least circumstantial evidence that senior leaders have, on at least two occasions, vetoed the deployment of capabilities that were within China's technological means. The two cases involved the nondeployment of the neutron bomb and the belated deployment of MIRVs. Despite having successfully tested an enhanced radiation warhead in 1988 and having had the capability to deploy neutron weapons since then, China has not done so.[9] The reasons for political veto remain somewhat unclear and are probably numerous: limited strategic utility, inconsistency with declaratory policy, and a general normative factor viewing such weapons in negative terms.[10] In the case of MIRVs, a 1999 Central Intelligence Agency report estimated that China had been capable of deploying multiple reentry vehicles for 20 years (thus as early as 1979).[11] The same report stated that MIRV capability could be fielded in "a few years." However, only in 2015 did unclassified estimates assess that China had actually deployed MIRVs (on a variant of its heavy, DF-5 missile)—representing a delay of between 15 and 35 years.[12] The main point in both cases is that scientific and military impetus, while perhaps accounting for some aspects of nuclear policy, may not always drive acquisition and deployment in the absence of political support.[13]

While elements of continuity in Chinese security policymaking persist, many of the conditions and institutions have changed in significant ways. Following his accession to power in 1978, Deng Xiaoping established regulations and procedures that would limit one-man rule and encourage adherence to collective leadership under the Politburo Standing Committee, currently comprising seven top leaders. Central to this move was the introduction of strict retirement ages for different positions within the party, military, and civilian bureaucracy. Even top leaders in the Politburo Stand-

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8 Lewis and Xue, 1988; Sun Xiangli, 2013, p. 12.

9 Jonathan Ray, *Red China's "Capitalist Bomb": Inside the Chinese Neutron Bomb Program*, Washington D.C.: Center for the Study of Chinese Military Affairs, Institute for National Strategic Studies, National Defense University, January 2015.

10 In 1988, Liu Huaqiu, a senior specialist with China's Commission for Science, Technology and Industry for National Defense, wrote that the weapon contradicted China's no-first-use doctrine, did not suit China's geography, was too costly, required too much plutonium and tritium for mass production, and was not as cost effective as precision guided munitions (Ray, 2015, p. 27).

11 National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," Washington, D.C.: Federation of American Scientists, 1999.

12 OSD, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015*, Washington, D.C.: U.S. Department of Defense, 2015, p. 9.

13 For more on this point, see Michael S. Chase, Stephanie Lieggi, Andrew S. Erickson, and Brian Lafferty, "China's Nuclear Weapons Program and the Chinese Research, Development, and Acquisition System," *SITC Policy Briefs*, Vol. 12, 2014.

ing Committee are not considered for reappointment after the age of 68.[14] Age limits have not only reduced the average age of senior political and government officials but also imposed an additional constraint on the general secretary's ability to place allies in key positions of authority, since regular retirements take many tested candidates out of circulation.

There has also been a trend toward the "regularization," or bureaucratization, of government, with the composition, roles, and functions of different actors being better defined and, to an extent, respected in policymaking. These phenomena have extended into the military realm. Where once the members of the CMC were appointed and replaced at the whim of the party chairman, both the number of members and the composition are now relatively stable, with key military organizations being regularly represented.[15] And while the ground forces are still the most prominent and influential military element, the other services (PLAN, PLAAF, and PLASAF) have gained in rank and bureaucratic standing. Finally, since the "third generation" of Chinese leaders associated with Jiang Zemin assumed power in 1989, civilian leaders have come to office with far less military experience and knowledge than their predecessors and have, therefore, been more dependent on advisors and the military itself for information and expertise.

All this might suggest a system with more scope for bureaucracies to influence policy. To be sure, critical elements of political control remain in place, and we may still expect the state to behave much as the rational-actor model might predict. The CMC, headed by the party general secretary, still dominates military policy, providing both a strong mechanism for top-down control and integration of service priorities and approaches. Military tendencies toward greater overt independence have been beaten back by the party, which demands and receives regular assurances from the military of fealty to the party. Xi Jinping has centralized power to an extent not seen since Deng Xiaoping in the 1980s.[16] Xi secured the control of the military faster and more completely than either Jiang Zemin or Hu Jintao. Xi's anticorruption campaign, while serving its stated goal of reducing the role of graft, also gives him a powerful tool to use selectively against political opponents.[17]

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[14] William A. Joseph, *Politics in China: An Introduction*, 2nd ed., New York: Oxford University Press, 2014, p. 213.

[15] The CMC currently has ten members. Its membership now includes, on a recurring basis, the heads of the four general departments (general staff, political, armaments, logistics), the heads of the air force, navy, and second artillery, two military vice chairmen and the chairman (Xi Jinping, the Chinese Communist Party general secretary).

[16] Elizabeth C. Economy, "China's Imperial President: Xi Jinping Tightens His Grip," *Foreign Affairs,* November/December 2014.

[17] Andrew Wedeman, Baogang Guo, and Eri Saikawa, "Xi Jinping's Tiger Hunt and the Politics of Corruption," *China Currents*, Vol. 13, No. 2, October 15, 2014.

Nevertheless, Xi operates in a system that is far different from the one Mao dominated. He remains constrained by rules, age limits, custom, and stronger bureaucratic institutions. The military, part of that bureaucracy, pays homage to the party, but is far more focused on professional matters and warfighting than it was during the Maoist era.[18] Against this backdrop, narrower dynamics in the nuclear realm play out. In the nuclear realm, the Central Special Commission, which brings together technical specialists and senior political leaders, still exists, but according to Chinese civilian experts engaged in nuclear research, its functions are more circumscribed. The day-to-day supervision of top leaders has declined since the 1960s and 1970s, and the role of the military in nuclear policymaking has grown.[19] Given the evolving political and administrative landscape in China, it is likely these bureaucratic factors will exert significant influence over nuclear outcomes in the years to come.[20]

Bureaucratic Politics and the Military Services

Most organizational theorists identify parochial interests, including manpower, budgets, independence, and prestige, as important drivers of bureaucratic behavior—and acknowledge that bureaucracies can have a decisive influence on national direction. Organizations push policies that will benefit themselves. They will sometimes independently decide policy (when regarded as within their areas of professional competence) or influence it through political interactions or bargaining.[21] This section considers the military services as actors in nuclear force structure and planning, their relative status and influence, and the interactions between the services. The elevation of the Second Artillery from branch to service (with its name change to *PLA Rocket Force*) will strengthen nuclear advocacy within the PLA, although the full contours of change are not yet entirely clear. What is clear is that the recent reforms consolidate changes that were already under way. Below, we address the evolution of the Second Artillery, PLAN, PLAAF, and the potential impact of the new Rocket Force, in that order.

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[18] Andrew Scobell, "China's Evolving Civil-Military Relations: Creeping Guojiahua," *Armed Forces and Society*, Vol. 31, No. 2, 2005.

[19] Interviews with Chinese experts, Beijing, May 16–17, 2014.

[20] Lampton highlights the challenges of civilian control as it pertain to the Chinese system (David M. Lampton, *Following the Leader: Ruling China, from Deng Xiaoping to Xi Jinping*, Berkeley, Calif.: University of California Press, 2014; see, especially, Ch. 6, "Soldiers and Civilians").

[21] On the impact of bureaucratic politics, especially the competition for manpower, resources, and prestige, see Allison, 1971; Jerel A. Rosati, "Developing a Systematic Decision-Making Framework: Bureaucratic Politics in Perspective," *World Politics*, Vol. 33, No. 2, 1981; Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars*, Ithaca, N.Y.: Cornell University Press, 1984; and Jack Snyder, *The Ideology of the Offensive: Military Decision Making and the Disasters of 1914*, Ithaca, N.Y.: Cornell University Press, 1984.

A note on terminology and organization is in order. We use the term *Second Artillery* when discussing missile force developments prior to 2016 and the term *Rocket Force* when discussing events since 2016 and when assessing projected future developments or impact. We divide the discussion of PLASAF and Rocket Force into two sections (with the Rocket Force discussed at the end of this section), in part to keep the chronology and temporal narrative of the various service summaries more consistent and, more important, because the ultimate shape of the Rocket Force (which is currently uncertain) will affect the nuclear positions of all the services.

PLA Second Artillery Force

On December 31, 2015, Chinese Premier and Party General Secretary Xi Jinping announced the name change for the Chinese missile force and its elevation from a branch [兵种] to a service [军中]. These changes followed logically from the increasing status that PLASAF had been enjoying up to that point. China's 2008 defense white paper described PLASAF as "a strategic force under the direct command and control of the CMC" that is "mainly responsible for deterring other countries from using nuclear weapons against China and for conducting nuclear counterattacks and precision strikes with conventional missiles."[22] PLASAF was officially established in July 1966 after ten years of missile and nuclear warhead development and the training of missile battalions.[23] PLASAF units made their first public appearance during the National Day parade in October 1984 to commemorate the 35th anniversary of the PRC's founding. In 1986, reports and images surfaced of the newly built PLASAF headquarters in Xishan, northwest of Beijing. In the early 1990s, PLASAF established a conventional missile program and began fielding conventional missiles.[24]

Although PLASAF was officially a branch of the PLA and, therefore, "one-half notch lower in bureaucratic rank" than a service, it had already gained many attributes of a service prior to 2015.[25] In official discussion of PLA elements, it was listed together with the services, last in the sequence behind the PLA Army, PLAN, and PLAAF. Like the services, PLASAF's conventional battlefield missiles would operate under cam-

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[22] State Council Information Office, *China's National Defense in 2008*, January 21, 2009.

[23] This section predominately from Bates Gill, James Mulvenon, and Mark Stokes, "The Chinese Second Artillery Corps: Transition to Credible Deterrence," in James C. Mulvenon and Andrew N. D. Yang, eds., *The People's Liberation Army as Organization: Reference Volume v1.0*, Santa Monica, Calif.: RAND Corporation, CF-182-NSRD, 2002. More pre-1990s PLASAF history is available in Kenneth Allen and Maryanne Kivlehan-Wise, "Implementing PLA Second Artillery Doctrinal Reforms," in James C. Mulvenon, and David Finkelstein, eds., *China's Revolution in Doctrinal Affairs: Emerging Trends in the Operational Arts of the Chinese People's Liberation Army*, Alexandria, Va.: Center for Naval Analyses, 2005.

[24] Michael S. Chase and Andrew S. Erickson, "The Conventional Missile Capabilities of China's Second Artillery Force: Cornerstone of Deterrence and Warfighting," *Asian Security*, Vol. 8, No. 2, 2012.

[25] Gill, Mulvenon, and Stokes, 2002, p. 520. See also Allen and Kivlehan-Wise, 2005, p. 167.

paign commanders in the event of a conflict.[26] Unlike the conventional missile forces, however, PLASAF's nuclear missile forces bypass this structure and are instead directly controlled by the CMC. Gill, Mulvenon, and Stokes note that, "[b]y necessity, it is therefore a very stove-piped institution, perhaps the most vertically integrated of all units with the People's Liberation Army."[27]

They go on to explain that:

> The central command and control center for all Chinese forces, including SAC [PLASAF], is located in Xishan, in the hills west of Beijing, where strategic operational orders originate. Direct communication with China's six launch bases would be passed through the SAC headquarters and its communications regiment. . . . At a political level, ultimate authority to use nuclear weapons is "subject to the unified command of the Central Military Commission. Only the commission's chairman . . . has the power to issue an order to use such weapons after top leaders reach a consensus on the issue."[28] However, it is likely that such a decision would require a consensus decision with the Central Military Commission and other senior military elders. In wartime, a "skip echelon" system would be in effect, with the central command communicating directly with launch bases.[29]

The CMC also directs changes to the Second Artillery's readiness level, from "third class," or normal conditions; to "second class," a warning and preparatory status; and, finally, to "first class," at which full preparations are completed and units await a launch order.[30]

Traditionally, the PLA has been an army-dominated institution, with the other services playing supporting roles. However, over the years PLASAF gained greater institutional standing within the PLA. This may reflect the increasing importance of missile forces, given PLASAF's more-sophisticated systems and platforms, both conventional and nuclear, and their relevance for potential future contingencies. As Chase, Erickson, and Yeaw noted, "China appears to be on the verge of reconciling the previously significant divergence between the Second Artillery's once largely aspirational doctrine and its actual capabilities."[31]

The Second Artillery's rise is also a function of the elevation of the PLA's technical services more generally. Since 2004, the PLASAF commander has, like the PLAN and

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26 Wortzel, 2007, pp. 9–10.

27 Gill, Mulvenon, and Stokes, 2002, p. 521. Note on PLA doctrine from Wortzel, 2007, p. 20.

28 Corroborated by analysis of the use of the term "supreme commander" [统帅部] to describe the CMC chairman as PLASAF's command authority in Wortzel, 2007, pp. 24–26.

29 Gill, Mulvenon, and Stokes, 2002, p. 546.

30 Wortzel, 2007, p. 20.

31 Chase, Erickson, and Yeaw, 2009, p. 74.

PLAAF commanders, been a member of the CMC.[32] The 2004 white paper noted that the PLA is emphasizing modernization of PLASAF and the other technical services:

> While continuing to attach importance to the building of the army, the PLA gives priority to the building of the navy, air force and Second Artillery Force to seek balanced development of the combat force structure, in order to strengthen the capabilities for winning both command of the sea and command of the air, and conducting strategic counterstrikes.[33]

The 2006 white paper stated that, "[t]hrough restructuring, the proportion of the navy, air force and Second Artillery Force [personnel] in the PLA has been raised by 3.8 percent, while that of the army has been lowered by 1.5 percent."[34] Recent white papers have emphasized the success of PLASAF's modernization programs and that its "capabilities of strategic deterrence, nuclear counterattack, and conventional precision strike are being steadily elevated."[35]

An examination of promotion time lines for the commanders of PLASAF, PLAN, and PLAAF shows that PLASAF promotions lagged until recently, when they normalized with the other technical services.[36] Li Xuge (1985–1992) was only a major general [*shaojiang*] when he became the PLASAF commander, waited three years to be promoted to lieutenant general [*zhongjiang*], and was never made a full general. Yang Guoliang (1992–2003), served as PLASAF commander for eight months before his promotion to *zhongjiang* and then waited nearly an additional five and a half years before becoming the first full general [*shangjiang*] to serve as PLASAF commander. In contrast, PLAN and PLAAF commanders were promoted to full general during or shortly after holding the commander post. From 1985–2015, all PLAAF commanders held the rank of *zhongjiang* or higher before assuming their positions. Recent PLASAF commanders have reached the rank of full general sooner and in line with their PLAN and PLAAF counterparts. Wei Fenghe, who was appointed commander in October 2012 and who now commands the Rocket Force, was promoted to full general less than a month after assuming command.

Over its 50-year history, a distinctive PLASAF identity and culture gradually emerged. The 76 biographies of top PLASAF's leaders found in the *China Strategic Mis-*

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32 James Mulvenon, "The King Is Dead! Long Live the King! The CMC Leadership Transition from Jiang to Hu," *China Leadership Monitor*, Vol. 13, January 30, 2005, p. 6.

33 State Council Information Office, "Revolution in Military Affairs with Chinese Characteristics," in *China's National Defense in 2004*, Beijing, December 2004b.

34 State Council Information Office, 2006.

35 "Modernization of the People's Liberation Army," in State Council Information Office, 2011; State Council Information Office, 2013.

36 Sources for this analysis include *China Strategic Missile Force Encyclopedia*, 2012, pp. 878–880, and biographies in Chinese online encyclopedia and other websites, such as Baidu.

sile Force Encyclopedia show that, although PLASAF leaders' paths to the role of commander have varied considerably over time, there has been a growing trend of career-length service in PLASAF or its antecedent organizations. Jing Zhiyuan (2003–2012) was likely the first commander to spend his entire career in artillery and PLASAF roles, although he entered the PLA in 1963, three years before PLASAF was founded. Wei Fenghe (2012–present) appears to be the first to spend his entire career only in PLASAF, except for a two-year stint as a deputy chief of the General Staff Department from 2010 to 2012.[37] The deputy chief slots have historically been dominated by PLA Army officers, so Wei's time as department's first deputy chief from PLASAF is also noteworthy. Wei Fenghe is also likely the first commander with leadership experience in PLASAF at the brigade level. In 1994, he commanded an unidentified missile brigade and received a second grade merit for successfully completing an experiment on large-missile launching.[38] The last four PLASAF commanders had experience in command of PLASAF bases.

Another important commonality among the recent PLASAF (and now PLA Rocket Force) commanders is crossover experience in both nuclear and conventional roles, which reflects the force's "dual deterrence and dual operations" mission [双重威慑, 双重作战].[39] Li Xuge (1985–1992) appears to be the first PLASAF commander to explore potential conventional roles for PLASAF. He led research on conditions on the role of PLASAF in conventional missiles and local conflicts and also established the first conventional missile training squadron.[40] Jing Zhiyuan (2003–2012) is likely the first commander to have had direct command experience with both conventional and nuclear forces, given PLASAF's introduction of conventional missiles in the early 1990s and reports that Jing played a role in China's response to the Taiwan Strait crisis in 1996.[41] Wei Fenghe (2012–present) also has experience with both nuclear and conventional forces; he was the chief of staff at 54 Base (Luoyang, Henan Province), which comprises brigades that field nuclear road-mobile missiles and ICBMs, before becoming commander of 53 Base (Kunming, Yunnan Province) in December 2002.[42]

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[37] General sources for Wei Fenghe's biography include Mark A. Stokes and L. C. Russell Hsiao, "Leadership Transitions in the Second Artillery Force at the 18th Party Congress: Implications for Roles and Missions," Asia-Eye Blog, May 7, 2012; 〈魏凤和简历〉 ["Wei Fenghe's CV"], *Sohu*, March 15, 2013; 〈魏凤和〉 ["Wei Fenghe"], Baidu, 2014.

[38] 〈魏凤和〉 ["Wei Fenghe"], 《中文百科在线》 [*Chinese Online Encyclopedia*], 2012.

[39] Yu Jixun, 2004, p. 270.

[40] 〈李旭阁同志生平 (1927–2012)〉 ["Comrade Li Xuge's Biography (1927–2012)"], 新浪博客 [Sina Blog], October 14, 2012.

[41] Shi Jiangtao, "Hu Flexes His Military Muscle," *South China Morning Post,* September 26, 2004.

[42] Michael S. Chase and Daniel Yoon, "Like Arrows on the Bent Bow: Nuclear and Conventional Capabilities of China's Second Artillery Force," paper prepared for the PLA as Organization conference, Washington, D.C., June 13–14, 2012, pp. 51–55; OSD, *Annual Report to Congress: The Military Power of the People's Republic of China*, Washington, D.C.: U.S. Department of Defense, 2005, p. 29.

Finally, PLASAF commanders also hold senior roles within the party apparatus. Jing Zhiyuan (2003–2012) became the first Second Artillery officer to serve on the CMC in September 2004.[43] Wei Fenghe (2012–present) is a current member of the CMC. All four of the most recent commanders have been members of the Central Committee.

PLA Navy and Nuclear Issues

The PLA Rocket Force may ultimately gain control of China's SSBNs (or the SLBMs stored in them), a possibility we explore later, in the subsection on the Rocket Force. Unless and until that happens, PLAN controls these assets. The development of China's blue water navy is well beyond the scope of this essay, but certainly signals a major change in PLAN's institutional role within the PLA and a great enhancement of China's capabilities more generally.[44] China's 2015 defense white paper's highlights the importance of maritime power:

> The seas and oceans bear on the enduring peace, lasting stability, and sustainable development of China. The traditional mentality that land outweighs sea must be abandoned, and great importance has to be attached to managing the seas and oceans and protecting maritime rights and interests. It is necessary for China to develop a modern maritime military force structure commensurate with its national security and development interests, safeguard its national sovereignty and maritime rights and interests, protect the security of strategic sea lines of communication and overseas interests, and participate in international maritime cooperation, so as to provide strategic support for building itself into a maritime power.[45]

This shift to a maritime focus is likely to have a range of implications for PLAN's strategic nuclear forces. First, the overall increase in PLAN's role will empower naval strategic thinkers. Second, increased naval forces will be better able to protect Chinese SSBNs from attack. Third, PLAN is likely to have a larger voice in security policy in general.

Although PLAN plays a secondary role to the Second Artillery in nuclear affairs—and may play an even more circumscribed role with the creation of the Rocket Force—

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[43] Adapted from Chase and Yoon, 2012, pp. 37–38; 〈靖志远〉 ["Jing Zhiyuan"], Baidu, 2014; 〈靖志远活动报道集〉 ["Report on Jing Zhiyuan's Activities"], *People's Daily Online*, 2009. See also Allen and Kivlehan-Wise, 2005, p. 216.

[44] See, for instance, Bernard D. Cole, *The Great Wall at Sea: China's Navy in the Twenty-First Century*, 2nd ed., Annapolis, Md.: U.S. Naval Institute Press, 2010, and Christopher H. Sharman, *China Moves Out: Stepping Stones Toward a New Maritime Strategy*, Washington, D.C.: National Defense University, China Strategic Perspectives 9, 2015.

[45] State Council Information Office, 2015.

it has possessed strategic capabilities for 40 years.[46] For most of this period, PLAN operated only the *Xia*-class (Type 92) SSBN, which was neither reliable nor safe. Thus, China's navy has not been forced to address nuclear strategy with the same degree of immediacy that the Second Artillery has. However, PLAN now increasingly engages on strategic nuclear issues. China's 2010 defense white paper highlights China's development of a sea-based deterrent, noting that PLAN is enhancing its "strategic deterrence and counterattack" capabilities.[47] Beijing's long-standing pursuit of a sea-based deterrent is aimed, in part, at enhancing the survivability of its nuclear force more generally. Although most observers assess that the first-generation *Xia*-class SSBN has never conducted a deterrent patrol, China's submarine-based nuclear deterrent finally is taking shape with the Type-094, or *Jin*-class, SSBN and the JL-2 SLBM.

The 2016 DoD report on Chinese military and security developments indicates that China has delivered four *Jin*-class SSBNs to PLAN, and "up to five may enter service before China begins developing and fielding its next-generation SSBN, the Type 096, over the coming decade."[48] Each submarine carries 12 of the new JL-2 SLBM, and each JL-2 is equipped with a single nuclear warhead of several hundred kilotons.[49] U.S. officials reportedly confirmed in December 2015 that a *Jin*-class SSBN had undertaken China's first-ever deterrence patrol.[50] When Chinese SSBNs are able to conduct regular deterrence patrols, China will effectively gain its "first credible, sea-based nuclear deterrent."[51] This will represent a critical development for Chinese strategic power, and the "incorporat[ion of] very different platforms . . . will greatly influence the operations of its future fleet."[52] From a strategic standpoint, submarines will likely be viewed as indispensable, not only because they are relatively survivable but also because they can (unlike all of China's land-based missiles) launch on trajectories that will not take missiles near U.S. strategic missile defenses positioned at Fort Greely, Alaska.[53]

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[46] 徐双喜, 钱晓虎 [Xu Shuangxi and Qian Xiaohu], 〈铸就共和国水下核盾: 海军某潜艇基地官兵驾 '蓝鲸' 40余年从横大洋创造数十项纪录〉 ["Forging the Underwater Shield of the Republic—Officers and Troops of a Certain Navy Submarine Base Set Tens of Records During More than 40 Years of Piloting 'Blue Whales' Across the Length and Breadth of the Vast Ocean"], 《解放军报》 [*PLA Daily*], October 28, 2013; 〈英雄核潜艇,大洋深处砺剑锋〉["Heroic Nuclear Submarines, Sharpening Swords in Depth of Vast Oceans"], 《解放军报》 [*PLA Daily*], October 29, 2013.

[47] State Council Information Office, 2011. That language is repeated in State Council Information Office, 2015.

[48] OSD, 2016, p. 26. See also Office of Naval Intelligence (ONI), *The PLA Navy: New Capabilities and Missions for the 21st Century*, Washington, D.C., 2015, p 19.

[49] See Zhou Wa, "China Seeks to Calm US Fears over Missile," *China Daily*, January 16, 2014; and Keck, 2014.

[50] Richard D. Fisher, Jr., "China Advances Sea- and Land-Based Nuclear Deterrent Capabilities," *IHS Jane's 360*, December 15, 2015.

[51] OSD, 2016, p. 26.

[52] ONI, 2015, p. 5.

[53] Ground-based interceptors associated with NMD are at Fort Greely, Alaska, and Vandenberg Air Force Base, California. Assuming they can maneuver and transit to firing positions within range of targets in the United

These developments will present the PLA leadership, and especially PLAN's, with a range of decisions over the coming months and years. The routine separation of warheads from launch vehicles that characterizes PLA's land-based nuclear force posture reassures Chinese and foreign leaders alike that Chinese nuclear forces cannot be used without authorization from central leaders. In the submarine-based force, similar separation will not be viable, so new procedures to address concerns related to unauthorized use will be required. Further, if the warheads are routinely mated with missiles for deterrence patrols, it is also possible that the ownership and storage of the warheads, which are reportedly maintained in central storage facilities held by the Rocket Force, may be transferred to PLAN for handling ease and security.[54] Similarly, decisions about the routine readiness will be required. Will China maintain continuous SSBN patrols as the French and British do? Although ONI seems to assume that to be the case, there is limited evidence from Chinese sources.[55]

PLAN leadership has become more professional and technologically savvy. To date, those with expertise in nuclear weapons have not figured heavily in PLAN's leadership, although the circumstances that have limited their rise may now be changing. According to two separate studies of PLAN leadership, conducted by ONI and the Center for Naval Analyses, PLAN is dominated by surface warfare officers. Thumbnail sketches of PLAN's top 19 leaders by ONI and of the top 91 leaders by the Center for Naval Analyses do not suggest any of these individuals has a significant background in SSBNs or nuclear strategic affairs more generally.[56] This is not surprising, given that there was only a single SSBN in the inventory for most of PLAN's nuclear history and that this boat rarely put to sea. This situation limited the career prospects for officers with nuclear weapon backgrounds. However, a few top PLAN leaders, including Vice Admiral Liu Yi (PLAN deputy commander since 2011) and Rear Admiral Yuan Yubai (North Sea Fleet commander), do have backgrounds on nuclear-powered attack submarines (SSNs). Admiral Sun Jianguo, assigned to the PLA General Staff Department as its deputy commander, had similar experience, culminating in command of what several Chinese sources refer to as the world-record–setting longest submarine cruise of 90 days.[57]

States without being detected and destroyed, SSBNs can fire on trajectories that do not take the missiles near either site.

54 For the best source on current practice of warhead storage, see Mark A. Stokes, "China's Nuclear Warhead Storage and Handling System," Arlington, Va.: Project 2049 Institute, March 12, 2010.

55 ONI, 2015, pp. 17, 19.

56 Jeffrey Becker, David Liebenberg, and Peter Mackenzie, *Behind the Periscope: Leadership in China's Navy*, Alexandria, Va.: Center for Naval Analyses, 2013, p. 123; ONI, 2015.

57 See, for example, ‹孙建国任军参谋 部副谋长 曾被称'小巴顿'› ["Sun Jianguo Appointed Vice Chief of Staff, Once Called 'Little Patton'"], «澎湃新闻» [*The Paper*], February 4, 2016.

In the short term, this paucity of PLAN leaders with significant experience in the strategic force will tend to retard strategic thought development within the navy (at least relative to the PLA Rocket Force). That said, the broader role of former SSN commanders should lead to attention to nuclear power plants that will benefit both future SSN and SSBN models. As operational commanders gain experience in the *Jin* class and get promoted, this should gradually change. And if the United States continues to develop missile defenses, as it is likely to do, the Chinese SSBN fleet will almost certainly receive greater attention, further enhancing the role and stature of its commanders. More broadly, the development of a blue water navy will likely produce a leadership more comfortable with strategic issues and facilitate the development of strategic naval capabilities.[58]

PLA Air Force

PLAAF does not currently have a strategic nuclear role, but air-delivered weapons were employed in several of China's early nuclear tests. The growing role of PLAN in nuclear delivery, assuming it does not lose that role to the PLA Rocket Force, could encourage PLAAF to reacquire a nuclear role for itself. PLAAF is currently seeking to recast itself as a "strategic air force," and although it has not defined such a force as necessarily nuclear capable, nuclear armament would be consistent with the desire for a larger, independent strategic role.[59] Certainly, a heavy bomber would be desirable from PLAAF's perspective, and a nuclear mission would help justify such an acquisition, but PLAAF does not require a heavy bomber to gain a nuclear role. China has already extended its reach by fielding long-range air-launched cruise missiles (DH-10s) that can be launched from H-6 medium bombers. A miniaturized warhead able to fit on a cruise missile represents another path to a nuclear air force, although that would require a policy change on the part of the PLA, which has not heretofore embraced tactical nuclear weapons. None of these potential developments has been publicly discussed by Chinese strategists, and there is no indication that such developments are either imminent nor even likely in the longer term. Nevertheless, the development of PLAN's nuclear force and the manifest desire of PLAAF officers to develop a larger, independent role for the air force do highlight the possibility.

The Creation of the PLA Rocket Force

The reforms of December 2015, which changed the name of the Second Artillery to the PLA Rocket Force and elevated its status from branch to service, will have a significant impact on the bureaucratic politics of nuclear weapons in China. Xi Jinping's military

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[58] David Liebenberg and Jeffrey Becker, "Recent Personnel Shifts Hint at Major Changes on the Horizon for PLA Navy Leadership," *China Brief*, Vol. 14, No. 3, February 7, 2014.

[59] Michael S. Chase and Cristina L. Garafola, "China's Search for a Strategic Air Force," *Journal of Strategic Studies*, Vol. 39, No. 1, 2016.

reforms have unfolded in stages, and the ultimate shape of the new Rocket Force is not entirely clear. Depending on the degree of reorganization during subsequent rounds of reform, the creation of the Rocket Force could fundamentally transform the bureaucratic landscape.

In announcing the bureaucratic promotion and changing the organization's name, Xi Jinping said: "The Rocket Force is our country's core strategic deterrent force; it is the strategic support for our country's major power status; and it is an important foundation for safeguarding our nation's security."[60] Other Chinese observers who have sought to explain the change note that the elevation brings the organization's status in line with its current state of material development, which has produced a large force with a range of capabilities critical to the PLA's overall function.[61] The change in formal status, and the political endorsement of the missile forces that has gone with it, will presumably make the Rocket Force a more capable advocate for nuclear weapons and delivery systems, for support systems that may still be lacking (such as space-based early warning systems), and for more-flexible interpretation of policy and doctrine.

A second change that was also announced on December 31, 2015, was the creation of the Strategic Support Force, which will also likely boost the prospects for the development of early warning capability. The Strategic Support Force will, among other things, assume most or possibly all PLA space functions, which have been operated up to the present directly by the PLA General Armaments Department.[62] For years, the Second Artillery had argued for a separate space component within the PLA, while PLAAF had sought to roll space into PLAAF under the rubric of an air and space force.[63] Hence, the creation of the Strategic Support Force represents an important bureaucratic victory for missile force officers. Both the commander and deputy commander of the new force were originally officers from Second Artillery Force.[64] Given that many other key personnel will come from the ranks of former Second Artillery

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60 "Meeting to Establish . . . ," 2016.

61 〈专家: 二炮为何升格为第四大军种火箭军?〉["Specialist: Why Was the Second Artillery Elevated as the Fourth Major Military Service to the Rocket Force?"], 环球网 [GlobalNet], January 9, 2016.

62 〈我国成立战略支援部队 体制上领先美军〉 ["China Establishes Strategic Support Force, Takes Lead over the United States in [Military] Structure"], 《腾讯新闻》 [*Tengxun Xinwen*], January 1, 2016.

63 For views on the proper use and organization of space forces with clear PLASAF leadership imprimatur, see 杨学军 [Yang Xuejun], 《优势来自空间—论空间战场与空间战争》 [*Advantage Comes from Space: The Space Battlefield and Space Operations*], Beijing: 国防工业出版社 出版时间 [National Defense Industry Press], 2006. For a competing set of views with clear PLAAF imprimatur, see 《空天一体作战学》 [*Study of Integrated Air-Space Operations*], Beijing: 解放军出版社 [PLA Publishing House], 2006.

64 岳怀让 [Yue Huairang], 〈战略支援部队: 高津任司令员, 刘福连任政治委员〉 ["Strategic Support Force: Gao Jin Appointed Commander, Liu Fulian Appointed Political Commissioner"], 《澎湃新闻》 [*Pengpai Xinwen, The Paper*], January 1, 2016; 〈两少将任战略支援部队首任副司令 生平简历公开〉 ["Brief Biographies of the Two Major Generals Appointed as Deputy Commanders of the Strategic Support Force"], 《大公報》 [*TaKungPao*], January 6, 2016.

officers—a function of relative similarity in educational requirements—the Strategic Support Force is likely to have strong ties to the missile forces for years to come.

It is unlikely that Xi Jinping's military reforms are complete, and it is unclear what future developments might hold. Some Chinese commentators have suggested that the PLA Rocket Force may ultimately be given responsibility for all Chinese strategic strike elements, including SSBNs and (future) strategic bombers, as well as ground-based missile forces.[65] These developments would, as one Chinese analyst noted, produce the world's first military service that controls all three elements of a nuclear triad. Without doubt, it would have momentous consequences from the standpoint of bureaucratic politics, creating a unified advocate for both nuclear and conventional strike. Other possible organizational reforms might see the PLA Rocket Force gain control of BMD or counterspace functions, both of which employ modified ballistic missiles as kinetic kill vehicles, or possibly of the space functions most closely associated with nuclear deterrence—specifically, early warning satellites. Given that Xi Jinping affirmed the concept of "combined nuclear and conventional" [核常兼备] in announcing the new Rocket Force, one change that will probably *not* occur is the hiving off of conventional ballistic missiles or their migration to another service.[66]

Bureaucratic Politics—Summary

There is certainly no guarantee that the new PLA rocket force will gain a monopoly over all Chinese nuclear elements. Whether or not it does, advocacy for a robust nuclear posture is likely to grow stronger in the years ahead. Most obviously, the Rocket Force will be a more influential actor, even without making additional organizational gains. With the deployment of a substantial fleet of *Jin*-class submarines, PLAN's interests in China's nuclear deterrent and deterrent posture have also increased, and PLAAF will almost certainly push for long-range bombers that could one day supply delivery for nuclear weapons. This bureaucratic landscape, combined with an international nuclear environment that Chinese strategists characterize as increasingly complex and challenging, is fertile ground for the further growth of Chinese nuclear capabilities. What kinds of capabilities are developed may be partly determined by organizational processes.

Organizational Process as a Potential Driver of Chinese Nuclear Force Structure

While Chinese political leaders determine budget totals and influence major procurement decisions, force posture choices largely emerge from the routine functioning of

65 "Specialist: Why Was the Second Artillery Elevated . . . ," 2016.

66 "Meeting to Establish . . . ," 2016.

the Chinese bureaucracy's organizational units. Examining the role that the routine functioning of these organizational units can have in force structure and force posture decisions highlights an alternative driver: organizational process.[67]

As noted earlier, Chinese leaders can and do intervene in force structure decisions. However, when Chinese leaders do not intervene in force structure decisions, organizational processes can play a larger role in shaping decisions. Organizations tend to behave according to SOPs, which means that organizational processes tend to produce a limited menu of options. In the case of force structure decisions, this often manifests itself in preferences for continued incremental improvements to a service's primary weapon system. Without the intervention of civilian leaders, a military service's organizational goals and procedures, as well as its research and design labs, tend to determine force posture. In this way, any single force posture decision can reflect the activity and interests of a cluster of research and development organizations, rather than a single conscious decision by leaders to acquire a capability. Over time, if this dynamic is not checked, it can create an emergent force structure, rather than one molded by a single rational actor pursuing an objective.[68]

To explore how organizational processes could drive nuclear force structure decisions, we examine the SOPs, perceptions, and priorities of the PLA Rocket Force, PLAN, and PLAAF and how those might shape the options proposed to national leaders. In doing so, we consider how these organizational processes could affect three key aspects of China's minimum deterrent policy: inventory, quality, and posture. China has historically fielded a small inventory of nuclear-capable delivery systems and nuclear warheads. In terms of quality, Chinese systems were, for many years, characterized by poor accuracies and long launch times.[69] In the case of posture, China's nuclear forces have historically been kept on low alert, with a priority on tight control over nuclear warheads at the expense of survivability. A single central storage location holds the majority of Chinese warheads, although a small number of warheads are routinely moved between the central storage location and smaller warhead storage facilities associated with each of the Second Artillery's six bases.[70]

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[67] This is inspired by Model II in Graham Allison's classic work (1971). Other scholars have presented the concept that internal, domestic factors are more likely to change China's nuclear posture than changes in the objective balance; see Lewis, 2007, p. 142.

[68] In complexity science and systems theory, *emergence* describes patterns or behaviors in complex systems that arise out of a large number of comparatively simple interactions. Examples include fractal patterns that emerge from continually reapplying a simple algorithm and the flocking behavior in fish or birds.

[69] Open-source assessments judge that, circa 1984, China had only three warhead designs: 15-kiloton, 3-megaton, and 4- to 5-megaton warheads (Lewis, 2007, p. 93). These legacy warhead designs would have to be miniaturized to fit in a reentry body as part of a MIRV payload.

[70] The 22 Base Headquarters in the Qinling mountain range is responsible for controlling all Chinese nuclear warheads. Its central warhead storage facility has been in Taibai since the late 1960s (Stokes, 2010).

There is some evolution in each of these dimensions. How might the evolving bureaucratic landscape described earlier, together with the influence of organizational processes and SOPs, work to reinforce or further shift these historical patterns? What would the implications be for Chinese nuclear policy and doctrine? The historical characteristics associated with China's nuclear inventory, quality, and posture have been consistent with both China's minimum deterrent doctrine and its no-first-use policy. China's minimum deterrent requires that only a small number of missiles survive a first strike and emerge capable of hitting primarily countervalue targets. Striking these targets, which might consist of cities and industrial centers, does not require a high degree of precision. And China's no-first-use policy, combined with its lack of launch on warning, suggests that Chinese nuclear forces would not be required to strike quickly. As we have seen, Chinese nuclear forces are evolving to meet the demands of a more challenging nuclear environment, and there has been significant change already in the characteristics described earlier—although most of the changes have to do with expanded numbers and greater survivability.

The discussion in the following subsections shows that organizational processes could create additional imperatives for greater change in the quality of Chinese nuclear weapons and in the posture associated with their deployment. A key question is whether these changes, should they occur, will create a force that is more suitable for a limited warfighting strategy that might be more flexible and offer more options to Chinese commanders but that might also undermine, to an extent, both arms race stability and crisis stability. The capabilities associated with such a force might include greater missile accuracy to hit and destroy hardened counterforce targets, dynamic targeting integrated to ISR networks enabling nuclear forces to attack targets of opportunity, the routine mating of missiles with warheads, the regular deployment of launchers, and the ability to coordinate and launch large salvos.

While some of these features (e.g., regular deployment of launchers) could be useful in cementing a more reliable minimum deterrent capability, they might, when combined, also provide China with some nuclear warfighting capability—one that might provide a more flexible response to nuclear attack or coercion, rather than one oriented to limit damage. New capabilities might lead Chinese nuclear commanders to advocate for de facto adjustment of operating concepts and doctrines, even if the capabilities themselves were developed without that goal originally in mind. If such adjustments are proposed, the technical advances that make the concepts possible will make the arguments of advocates more compelling.

PLA Rocket Force

The SOPs, perceptions, and priorities of the Rocket Force (and the Second Artillery Force through 2015) could have a profound effect on nuclear force structure. The Second Artillery Force began as an organization exclusively concerned with operating nuclear-armed missiles, but it assumed a conventional missile strike mission in the

early 1990s. Since then, it (and now the Rocket Force) has fielded a growing number of brigades armed with conventional missiles. By 2016, roughly one-half of the Rocket Force's brigades were armed with conventional missiles, and about two-thirds of its launchers were for conventional missile systems.[71] While the nuclear mission will remain the Rocket Force's most important task, the balance between nuclear and conventional assets in the ground-based missile inventory will likely continue to evolve in favor of the latter. The only specific equipment priority that Xi Jinping mentioned in his remarks on the establishment of the Rocket Force called for "strengthening medium-range precision strike forces," which, in the Chinese lexicon, includes both medium- and intermediate-range systems.[72]

The operating procedures developed for these conventional missiles have given the Rocket Force experience dispersing ballistic missiles for survivability, maintaining communications and sustainment with the dispersed forces, and remaining prepared to launch an attack in the face of adversary countermeasures. Greater experience operating ballistic missile TELs in the field could make the Rocket Force more confident in its ability to disperse its *nuclear* forces during a crisis for survivability and more able to support those dispersed forces logistically while they are conducting dispersed operations. This expanded capability would be a significant step forward for China's nuclear forces. Earlier assessments of China's nuclear command, control, and communication networks judged that their technical and operational practice might be weak.[73] Improvements, derived initially from exercises with conventional missile forces, could affect the nuclear options presented to Chinese leaders and provide them with some elements of a warfighting capability, all without forswearing a no-first-use policy. A launch-on-warning option might similarly evolve from the quick-launch capabilities developed for the Rocket Force's conventionally armed ballistic missile force.

In addition, the technologies developed by the Rocket Force for its conventional ballistic and cruise missile forces could shape the design requirements set down for China's new nuclear forces. When China fields new nuclear-armed missiles, the designs could be influenced by technologies originally developed for conventional TBMs. High-quality guidance and control technology (inertial navigation systems, satellite navigation systems, postboost maneuvers) could be included in nuclear forces because they are "on the shelf" and the research and development organizations associated with the Rocket Force have already invested in them. The result could be a next-generation nuclear ballistic missiles that are more accurate than the Rocket Force's legacy ICBMs.

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71 The latest open-source assessment credits the Rocket Force with 29 brigades (not including three training brigades), at least 15 of which are armed with conventional ballistic or ground-launched cruise missiles. (A 16th is armed with an unknown variant of the DF-26, which can be either nuclear or conventionally armed.) It has between 142 and 158 launchers (silos and transporter-erector-launchers [TELs]) for nuclear missiles and between 309 and 325 TELs for conventional missiles (International Institute for Strategic Studies, 2016).

72 "Meeting to Establish . . . ," 2016.

73 Lewis, 2007, p. 38.

Advances in the Rocket Force's conventional force structure could have a particularly important influence on the two key characteristics cited earlier as being distinguishing factors between a minimum deterrent strategy and a counterforce strategy: accuracy and dynamic targeting capabilities. Building highly accurate ballistic missiles requires mastering a host of different technology and engineering challenges. In addition to high-quality guidance and control capabilities, a country must make highly reliable and consistent components. For example, solid-fueled rockets cannot throttle their thrust, so guidance and control systems need to conduct energy-management maneuvers to place the missile payload into the correct position with the correct velocity for it to reach its target. Inconsistencies in the burn rate across missiles can produce errors that the guidance and control system cannot compensate for, making the production of solid rockets to highly consistent specifications critical. China has made great strides in all these areas to achieve high accuracies for its conventional ballistic missiles. Given the lack of firewalls between the conventional and nuclear sides of PLASAF, we might expect to see these same technologies applied to any new nuclear missiles China makes.[74]

Similarly, the Rocket Force has been building its command, control, communications, computers, and ISR capabilities to strike dynamic targets, such as aircraft carriers, with the DF-21D antiship ballistic missile. The experience, training, and technology developed for this conventional mission could expand to apply to more portions of the conventional force (starting perhaps with systems that might target dynamic land targets, such as the DF-21C) and, ultimately, to include the nuclear force.

Another potential example concerns the development of new classes of IRBMs. China rolled out a new IRBM, the DF-26, during its August 2015 military parade, and announced that it would have conventional land-attack, antiship, and nuclear variants.[75] It is likely that, during the design phase, many of the missile's characteristics (such as accuracy) were determined by the requirements for the conventional variant. Barring a deliberate requirement to cripple the accuracy of the nuclear variant, this would lead to a much more accurate and faster-firing nuclear IRBM than China's legacy DF-3 (CSS-2) IRBMs, which entered service in the 1970s. As the 2016 DoD report on Chinese military power notes, if the nuclear version of the DF-26 "shares the

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[74] It is possible that centralized authority might exercise influence to prevent a future nuclear missile from being equipped with a maneuverable reentry vehicle (to maintain a force structure more clearly aligned with the minimum-deterrent approach), but the accumulation of precision across the rest of the missile could still significantly increase accuracy over that of legacy Chinese nuclear missiles. This would be particularly true if the Rocket Force developed high-quality inertial navigation systems (perhaps with stellar updates, as with the U.S. Trident SLBM) out of paranoia about relying too heavily on satellite navigation signals that could be jammed during a conflict with the United States.

[75] 〈阅兵首次公开: 新型东风26导弹具备反舰能力〉 ["Revealed Publicly at the Military Review: The New DF-26 has Anti-ship Capability"], 《新浪军事》 [*Sina News*], September 5, 2015.

same guidance capabilities" as the conventional version, it "would give China its first nuclear precision strike capability against theater targets."[76]

According to a rational-actor interpretation, this would be a clear indication that China's leaders intended to move beyond a strict minimum deterrence and develop a more flexible and robust nuclear force capable of a range of nuclear warfighting missions. According to the organizational process model, however, this could simply be the result of an organizational proclivity of the Rocket Force, or perhaps even the defense industry, to continue incrementally modernizing primary weapon systems, standardize and modularize missiles to simplify logistics and support, and continue expanding the reach of China's conventional missile systems. The two possibilities are not mutually exclusive, and, more importantly, the implications would be the same.

PLA Navy

As PLAN acquires a more viable and robust nuclear capability, the PLA will likely face pressure to change its SOP for handling nuclear weapons—at least in the case of SSBNs and possibly more widely. Currently, China maintains most of its nuclear forces in a very low state of readiness. If China intends to have its SSBNs conduct deterrence patrols, it will have to adapt this SOP to enable the mating of nuclear weapons with ballistic missiles more routinely during peacetime.[77] If China chooses to send its SSBNs on routine patrols, as other nations do, this could have spillover effects on PLA Rocket Force practices. If PLAN begins to maintain permanent warhead storage facilities and is routinely mating warheads to its SLBMs for patrols, the Rocket Force might see this as a challenge to its status as the nation's leading nuclear force. The Rocket Force might respond by arguing that it ought to start conducting its own "deterrence patrols," regularly mating nuclear warheads to its road-mobile ICBMs and dispersing them from their bases more frequently or regularly.

Also, PLAN will likely need its own nuclear warhead storage facilities near SSBN bases. This proliferation of nuclear warhead storage facilities might motivate the Rocket Force to expand its own storage facilities. Routine SSBN patrols will likely require China to improve the technical controls on its warheads. As of the late 1990s, China was not believed to have permissive action links on its warheads. Jeffrey Lewis cites this as evidence that China does not plan on frequently deploying warheads mated to delivery systems, instead relying on physical separation between the launcher and war-

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[76] OSD, 2016, p. 25.

[77] There are, of course, alternatives. China might choose to keep its SSBNs in port during peacetime, perhaps in some sort of hardened submarine pens. PLAN might get its own warhead storage facilities near the SSBNs but would not mate the warheads except during a crisis. During a crisis, the Chinese could mate the warheads with the SLBMs and have the SSBNs deploy. Alternatively, PLAN could choose to have its SSBNs patrol without nuclear warheads to create doubt in the mind of potential adversaries: The question would be whether adversaries could be sure that there were no warheads on a submarine.

head to avoid accidental and unauthorized launches.[78] Adding sophisticated technical controls to facilitate SSBN patrols could open the door for more regular Rocket Force deployments with mated warheads.

Nuclear submarines provide another potential source of nuclear force structure creep. China's first generation *Xia*-class SSBN was catastrophically noisy, effectively negating its deterrent value. The new *Jin*-class (Type 094) boats are reportedly quieter than the Type 092 but still noisy by modern standards.[79] The deployment of at least four *Jin*-class submarines indicates that China judges them adequate for its current needs, at least until the future Type 096 SSBN enters service. As China's ability to make quieter SSNs improves, these quieting technologies could be incorporated into China's next-generation SSBN. As its antisubmarine warfare and submarine-quieting capabilities improve, PLAN might gain confidence that its SSBNs could conduct deterrence patrols. Improved satellite navigation capabilities and improved ballistic accuracies could combine to make China's next SSBN far more survivable and a potent nuclear warfighting platform. China could choose to procure and operate a nuclear force structure well below its demonstrated technological capacity but would have to make this choice repeatedly and potentially in the face of continuing pressure from constituencies that advocate a more robust nuclear warfighting capability.[80]

PLA Air Force

As noted earlier, PLAAF has already expanded its ability to make long-range strikes by fielding a long-range air-launched cruise missile (the DH-10), which can be launched from the H-6 medium bomber. Should China miniaturize nuclear weapons to fit on cruise missiles, this would provide a weapon with pinpoint accuracy and immense flexibility and might provide the PLA with additional nuclear flexibility. It would also further stretch the boundaries of China's nuclear policy and doctrine and set off additional alarm bells throughout the region about Chinese inventions and direction. With perhaps the most obvious implications for nuclear doctrine and thinking, this might be a critical test case (although not the only one) for whether Chinese leaders will resist nuclear force structure creep.

Conclusion

China's future nuclear forces will be shaped by both international and domestic factors. For China, bureaucratic factors are likely becoming more important over time, as

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78 Lewis, 2007, p. 38.

79 ONI, 2009.

80 Lewis (2007, pp. 43–44) cites some voices in the PLA who argue for more operational flexibility for China's nuclear forces.

the PLA moves farther from its revolutionary roots and as its component organizations assume more distinct identities. Regardless of whether the PLA gains additional assets, such as SSBNs or strategic bombers, the establishment of the PLA Rocket Force creates a far more powerful advocate for nuclear forces and missions. PLAN and PLAAF have made incremental gains in overall status over the years, and officers with an interest in nuclear missions within these services, especially PLAN, will gain further prominence with the evolution of more capable equipment. External events that make China's nuclear environment appear more challenging and bureaucratic drivers are likely to be mutually reinforcing.

The development of Chinese nuclear force structure may also be shaped by technological advances in conventional missile and naval forces, which will pose new questions for Chinese leadership. Not applying technologies developed for conventional systems to nuclear ones would require national leaders to set requirements for *less*-accurate guidance systems, for example, on nuclear-armed ballistic missiles than on their conventional counterparts. In earlier decisions regarding China's nuclear force posture, the leadership faced decisions about whether to develop a given capability. Now, it is just as likely to face questions about *not* introducing a capability—all to maintain a self-consciously minimum-deterrent strategy and believable no-first-use policy.

Unless China's political leadership maintains strict self-discipline, the PLA could develop a range of capabilities associated with disarming first strikes, a damage-limitation launch-on-warning posture, or a second-strike approach that embraced extended nuclear warfighting or counterforce targeting. Note that this does not mean that, even if it did acquire such capabilities, China *would* discard its no-first-use pledge, just that the opportunities to discard no-first-use and adopt a new policy would emerge. Even without formal changes to policy or doctrine, this could exacerbate security dilemmas with neighbors. Developing the capabilities discussed above could also open the door for voices arguing for more counterforce options and a more robust nuclear policy. It would remove one of the key hurdles preventing such moves, the inadequacy of Chinese nuclear force structure for anything other than a minimal deterrent, and would make the arguments of proponents more persuasive and less expensive. Maintaining a minimal deterrent would require increasing attention and effort to lean against the prevailing winds of precision, responsiveness, mobility, and warfighting preparation generated by China's modernization of its conventional forces.

While the constraint of a single, strong, and enduring political leadership could contain dissenting voices in various organizations, should the leadership be strongly committed to that goal, the increasing salience of bureaucracies in Chinese decision-making, especially military decisionmaking, will likely allow greater scope for organizational process and SOPs to influence outcomes. A number of PLA officers and defense researchers have advocated discarding China's minimum-deterrence strategy in favor of more-robust approaches. While a strict reading of China's no-first-use

pledge concludes that the sole purpose of China's nuclear forces is to deter a nuclear attack on China, there are a variety of views among Chinese strategists about how useful nuclear weapons can be in deterring conventional attacks.[81] Some Chinese strategist have suggested the PLA should develop limited nuclear warfighting capabilities, but the majority couch their recommendations for modernizing the PLA's nuclear force structure in terms of improving its survivability to ensure the credibility of China's deterrent.[82] Without sustained intervention from a strong leader who can intervene to quell the voices arguing for an expanded nuclear strategy and who can halt incremental improvements that could gradually expand the ambition of China's nuclear strategy, significant changes could occur in the practice and meaning of policy, even if the labels remain unchanged.

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[81] James Mulvenon, Murray Scot Tanner, Michael S. Chase, David R. Frelinger, David C. Gompert, Martin C. Libicki, and Kevin L. Pollpeter, *Chinese Responses to U.S. Military Transformation and Implications for the Department of Defense*, Santa Monica, Calif.: RAND Corporation, MG-340-OSD, 2006, p. 96.

[82] Mulvenon et al., 2006, pp. 96–97.

CHAPTER EIGHT

Material Resources and Constraints

To what extent will relevant resources constrain or facilitate change in China's nuclear inventory or strategy? Here we consider two types of resources, financial resources and fissile material.

China's Budgetary Environment

For more than three decades, rapid Chinese economic growth has been one of the key features not only reshaping global economic relations but also underwriting a shift in the regional and global balance of power. The Chinese economy has slowed in recent years, and that trend will likely continue into the future, but most economists believe that it will continue to beat the global average for at least the next decade.

Between 1980 and 1999, real Chinese economic growth averaged just over 10 percent, despite chronic battles with inflation and volatility. Between 2012 and 2015, real growth slowed to an average of 7.5 percent.[1] As of this writing, the economy appears to be encountering significant turbulence. There is now general consensus among both Chinese leaders and Western analysts that the causes are structural. In March 2007, then-Premier Wen Jiabao offered that the Chinese economy was "unstable, unbalanced, uncoordinated, and unsustainable." Of these "four uns," *unstable* refers to financial instability, particularly the economy's heavy dependence on excessive investment and credit for growth; *unbalanced* to widening regional and urban versus rural disparities; *uncoordinated* to a poor balance between investment and consumption and to an over-reliance on exports; and *unsustainable* to energy and environmental concerns.[2] In the years since Wen's speech, these issues have grown more serious. Of particular concern to many economists has been the increased reliance on capital investment as growth has declined. Gross capital formation averaged 47 percent of GDP between 2010 and

1 World Bank, "GDP Growth (Annual %)," data, 2016a.

2 "Premier: China Confident in Maintaining Economic Growth," Xinhua, March 16, 2007.

2014, compared with an average of 41 percent during the 2000s and 39 percent during the 1990s.[3]

Given the nation's economic challenges, Chinese leaders face an increasingly pressing question: Should they continue to advance the policies that netted near-double-digit growth for the past few decades but may ultimately cause a significant shock or dislocation in the future, or should they instead push for serious structural reforms that, while addressing the issues Wen raised in 2007, may lead to slower GDP growth for a decade or more? Early indicators are ambiguous but appear to suggest a continued unwillingness to make a decisive choice. At the Third Plenum of the Party's 18th Congress, held in November 2013, the government indicated strong political will to make the necessary adjustments, even at the cost of short-term pain.[4] But at China's annual legislative sessions in March 2014, Premier Li Keiqiang announced an unchanged yearly growth target 7.5 percent, arguing, "We must keep economic development as the central task and maintain a proper economic growth rate."[5] Since then, the leadership has consistently demonstrated a preference for propping up short-term economic growth over market-oriented structural reform.[6]

In light of so much uncertainty, it is hard to predict how the Chinese economy will grow in the coming years. There is, however, broad consensus among economists and investors that the days of predictable double-digit growth are over. The International Monetary Fund forecasts that growth will decline to between 6.8 and 6.0 between 2016 and 2020. The World Bank also sees growth declining to 6.9 percent by 2017, while the Economist Intelligence Unit predicts that annual growth will fall to 5.5 percent by 2019. The Organisation for Economic Co-Operation and Development offers to the longest horizon and predicts that growth will reach 5.1 percent by 2020 and decline further to 3.5 percent by 2030.[7] Finally, Beijing University's Michael Pettis, the longtime dean of foreign Chinese economy watchers, suggests that continued 7.5 percent growth in the short-term can only be sustained by short-sighted policies that will further aggravate the economy's structural imbalances. Pettis estimates that, if the party does carry out the necessary reforms, China's economy will grow by only

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3 World Bank, "Gross Capital Formation (% of GDP)," data, 2016b.

4 See, for example, Arthur R. Kroeber, "Xi Jinping's Ambitious Agenda for Economic Reform in China," Washington, D.C.: Brookings Institution, November 17, 2013.

5 "China Retains 7.5% Growth Target for 2014," Bloomberg News, March 5, 2014.

6 See, for example, Barry Naughton, "Reform Agenda in Turmoil: Can Policy-Makers Regain the Initiative?" *China Leadership Monitor*, No. 48, Fall 2015.

7 For the International Monetary Fund, Economist Intelligence Unit, and Organisation for Economic Co-Operation and Development projections, see "China GDP Growth Forecast 2015–2010 and up to 2060, Data and Charts," Knoema.com, 2016. For the World Bank projection, see World Bank, "Global Economic Prospects: Forecast Table," 2015.

3 to 4 percent a year for the next decade but will establish the foundation for a healthier form of growth in the future.[8]

Barring a military conflict with neighbors or a dramatic change in China's international position, growth in military spending is likely to mirror that of the economy as a whole. China's official defense budget has grown substantially in real terms since 1996 but has not changed significantly relative to total economy. As Table 8.1 indicates, China's official defense budget fluctuated between 1.2 and 1.4 percent of GDP between 2000 and 2015.

Chinese budgets are relatively opaque, and China's official defense budgets do not include a number of military-related expenses—a phenomenon that is not at all unique to China.[9] Including "off-budget" spending would likely add somewhere between 50 and 100 percent more to the budget—bringing China's defense budget to roughly 2.0 to 2.5 percent of GDP.[10] However, the main point here is there is no reason to believe that such off-budget spending has grown in proportion to the official budget over time and some reason to suspect the opposite. In particular, the overseas purchase of military equipment, which comprises one of the largest categories of unaccounted expenses, has declined in recent years relative to the defense budget as a whole as China's defense industry has matured and as Russia has grown wary of Chinese intellectual property rights violations. Hence, stability in military budget shares relative to the larger economy is real and is consistent with the language and intent of China's 1997 National Defense Law, which stipulates that the "growth in national defense funding should be based on national defense needs and *the level of the civilian economy*."[11]

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8 See Michael Pettis, "China Does Not Need to Grow at 7.5 Percent," Washington, D.C.: Carnegie Endowment for International Peace, July 18, 2013, and Michael Pettis, "Will the Reforms Speed Growth in China?" China Financial Markets blog, January 5, 2014.

9 All countries include different items in their published defense spending figures. In the United States case, the veterans related expenses alone would add almost 20 percent to the defense budget, and many intelligence- and nuclear-related functions are also not included. In the Chinese case, military-related expenditures not included in the defense budget include spending on the People's Armed Police, military family compensation and spending, government research and development with potential dual-use applications, subsidies to potential dual-use industries, arms imports, arms sales profits, intelligence, and some aspects of nuclear spending. The first two of these are published in Chinese budgets under separate headings, while some of the others can be estimated. On these issues, see Gilboy and Heginbotham, 2012.

10 SIPRI estimates actual Chinese 2014 defense spending at 2.1 percent of GDP (Stockholm International Peace Research Institute, "SIPRI Military Expenditure Database," 2016); and Gilboy and Heginbotham (2012, p. 117) estimates spending at roughly 2.0 percent of GDP, excluding spending on intelligence and nuclear weapons ("strategic programs"). A 2005 RAND Corporation study assessed it at between 2.3 and 2.8 percent of GDP (Keith Crane, Roger Cliff, Evan S. Medeiros, James C. Mulvenon, and William H. Overholt, *Modernizing China's Military: Opportunities and Constraints*, Santa Monica, Calif.: RAND Corporation, MG-260-1-AF, 2005.

11 《中华人民共和国国防法 (1997年3月14日) 第八届全国人民代表大会第五次会议通过》 [*National Defense Law of the People's Republic of China, Fifth Session of the Eighth National People's Congress*], Ch. VI, Art. 35, March 14, 1997; emphasis added. For a number of years prior to the law's passage, Chinese defense budgets had declined relative to GDP. Some members of the military delegation to the National People's Congress had sought to for-

Table 8.1
Chinese National Defense Spending as a Percentage of GDP, 2000–2016 (est.)

Year	Percentage
2000	1.23
2001	1.32
2002	1.42
2003	1.40
2004	1.37
2005	1.32
2006	1.26
2007	1.30
2008	1.30
2009	1.36
2010	1.33
2011	1.24
2012	1.25
2013	1.24
2014	1.27
2015	1.31
2016 (est)	1.32

SOURCES: Percentages calculated according to GDP data found in International Monetary Fund World Economic Outlook Database and China's official defense budget, as published annually in a variety of sources (e.g., Xinhua reports).

Assuming that economic growth remains at roughly 4 to 6 percent over the next ten to 15 years and that defense budget increases track roughly with economic growth, Chinese planners will almost certainly have sufficient financial resources for continued nuclear modernization (including some growth in strategic system numbers)—without

mally peg defense spending as a specific percentage (3.0 percent) of GDP in draft versions of the law. Although a formal peg was rejected, the language quoted here was inserted. On efforts to peg the defense budget formally to GDP, see 迟浩田 [Chi Haotian], 〈关于中华人民共和国国防法 (草案) 的说明〉 ["An Explanation of the PRC National Defense Law (Draft)"], in 《中华人民共和国第八届全国人民代表大会第五次文件汇编》 [*Documents on the PRC Fifth Session of the Eighth National People's Congress*], Beijing: Zhejiang People's Press, 1997.

impinging on other key PLA priorities. First, 4- to 6-percent annual growth, impressive by most standards, will provide some scope for further modernization even if no change occurs across services in the distribution of PLA budgets. Second, as other analysts have observed, China has traditionally punched well below its weight in the nuclear realm, and a modest rebalancing toward nuclear modernization would be well within the PLA's means. Such rebalancing could result from a perceived increase in the salience of nuclear weapons or in nuclear threat perception—both of which appear to have occurred—and it could be further boosted by recent bureaucratic changes, such as the establishment of the PLA Rocket Force and the growth of the SSBN community within PLAN. Finally, it should be observed that many improvements (such as the deployment of new penetration aids) may be relatively inexpensive, and the cost of deploying new missiles may, in part, be offset by retiring antiquated systems (such as DF-3A and DF-4 missiles) and converting the force structure to support a more modern inventory.

Fissile Material as a Limiting Factor

Estimates of current and future Chinese nuclear capabilities must also take into account the amount of fissile material China could have available to devote to modernizing and expanding its stockpile of nuclear weapons. Based on available open-source analysis, it appears that China has sufficient fissile material to continue modernizing its nuclear forces over the next decade, but not enough to "break out" and challenge U.S. or Russian warhead numbers.

Historically, China produced highly enriched uranium (HEU) for nuclear weapons at two facilities: the Lanzhou gaseous diffusion plant and the Jinkouhe-Heping gaseous diffusion plant. China also produced plutonium for nuclear weapons at two locations: the Jiuquan Atomic Energy Complex and Guangyuan plutonium production complex.[12] According to Jeffrey Lewis, the Lanzhou and Jiuquan facilities "were converted to civilian use in the 1980s, then shut down for a period of time. China appears to have decommissioned its facilities at Guangyuan; the status of highly enriched uranium production at Jinkouhe/Heping is less clear."[13] The amount of tritium is another factor that is relevant in assessing the number of nuclear weapons China could produce

[12] China built the Jinkouhe-Heping plant and Guangyuan plutonium production complex as "third front" facilities. This was part of a massive effort in the 1960s to relocate strategic industries to remote areas of China to better protect them from U.S. or Soviet attack. On this program, see Barry Naughton, "The Third Front: Defense Industrialization in the Chinese Interior," *China Quarterly*, Vol. 115, 1988.

[13] Jeffrey Lewis, "China's Nuclear Idiosyncrasies and Their Challenges," Paris: Institut Français des Relations Internationales, Proliferation Papers No. 47, November–December 2013.

and probably also limits the size of China's nuclear arsenal.[14] Today, China has a large and growing civilian enrichment program and is moving toward building reprocessing facilities to produce fuel for breeder reactors.[15]

In contrast to the other recognized nuclear weapons states, China has not made any official declarations about its production of HEU and plutonium for nuclear weapons.[16] China (along with France and Russia) also has not publicly released information about its total fissile material stocks.[17] Nonetheless, scholars have estimated the amount of HEU and plutonium China could have available for its nuclear weapons program.[18] According to Harvard University's Hui Zhang, China could have produced about 16 to 24 tons of HEU at its Lanzhou and Heping plants. Subtracting about 4 tons of HEU to account for nuclear-weapon tests, research reactor fuel, and process losses would leave China with an estimated stockpile of about 12 to 20 tons of HEU for nuclear weapons.[19] According to the same assessment, China could have produced 1.5 to 2.5 tons of plutonium for its nuclear-weapon program, of which it used perhaps 0.2 tons in its nuclear tests before it stopped testing and signed the Comprehensive Test Ban Treaty. That would leave China with an inventory of 1.3 to 2.3 tons of plutonium for its nuclear-weapon program.[20]

From these estimates, Hui Zhang concludes that China's existing stockpile of fissile material, although relatively small, is likely "sufficient for its current modernization programs."[21] Notwithstanding the uncertainties inherent in open-source estimates of Chinese fissile material stockpiles, this judgment is consistent with official U.S. statements, which indicate that China's stockpile of fissile material is likely adequate to modernize and increase the size of its nuclear arsenal.[22] For example, in March 2009,

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14 According to Hans Kristensen, "China probably only produces enough Tritium at its High-Flux Engineering Test Reactor (HFETR) in Jiajiang to maintain an arsenal of about 300 weapons" (Hans M. Kristensen, "No, China Does Not Have 3,000 Nuclear Weapons," FAS Strategic Security Blog, December 3, 2011).

15 Hui Zhang, "Reprocessing in China: A Long, Risky Journey," *Bulletin of the Atomic Scientists*, April 10, 2015b; Hui Zhang, *China's Uranium Enrichment Capacity: Rapid Expansion to Meet Commercial Needs*, Cambridge, Mass.: Harvard Kennedy School, Belfer Center for Science and International Affairs, Project on Managing the Atom, August 2015a.

16 International Panel on Fissile Materials (IPFM), *Global Fissile Material Report 2013: Increasing Transparency of Nuclear Warhead and Fissile Material Stocks as a Step Toward Disarmament*, Princeton, N.J., 2013.

17 IPFM, 2013, p. 31.

18 Hui Zhang, "China's HEU and Plutonium Production and Stocks," *Science & Global Security*, Vol. 19, No. 1, 2011.

19 IPFM, 2013, p. 13.

20 IPFM, 2013, p. 20.

21 Hui Zhang, 2011, p. 83.

22 For example, DoD's January 2001 report on proliferation issues noted, "China currently is not believed to be producing fissile material for nuclear weapons, but has a stockpile of fissile material sufficient to improve or

the director of the Defense Intelligence Agency stated: "China likely has produced enough weapon-grade fissile material to meet its needs for the immediate future."[23]

These statements, as well as assessments by nongovernmental experts, suggest that China likely possesses enough fissile material to expand its arsenal in line with its near-term requirements but not enough to match the size of the U.S. or Russian nuclear arsenals, which are limited to 1,550 operationally deployed strategic nuclear weapons under the New START Treaty.[24] The specific number of nuclear weapons that could be produced with a given amount of fissile material, of course, depends on the amount required for each weapon. For example, based on Hui Zhang's fissile material stockpile estimates and the assumption that Chinese nuclear weapons are similar to the hypothetical modern nuclear warhead design described in a recent IPFM report, China's nuclear arsenal would be limited to about 575 nuclear weapons.[25]

While specific numbers are necessarily speculative given China's lack of transparency, this hypothetical example illustrates that fissile material is a constraint that must be taken into account when assessing China's current and future nuclear weapon capabilities. This may become even truer as China deploys additional MIRVed warheads, which may not require more aggregate fissile material than a smaller number of unitary ones but may require a different mix of material. This analysis suggests China has the capacity to increase its deployed warhead numbers but would not be able to reach numerical parity with the United States and Russia during the period covered by this report (through the 2020s). In the longer term, China could produce significant additional weapon-grade fissile material if, for example, it moves forward with and completes the large commercial reprocessing plant under discussion with French firm Areva—or if it simply embarked on specialized plants optimized to produce such material.[26] Even if the Areva plant proceeds, however, it will not be in operation until roughly 2030, and other facilities would also take considerable time to complete.[27]

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increase its weapons inventory" (OSD, *Proliferation: Threat and Response*, Washington, D.C.: U.S. Department of Defense, 2001, p. 14).

23 Michael D. Maples, "Annual Threat Assessment," statement before the Senate Armed Services Committee, March 10, 2009, p. 2.

24 See Kristensen, 2011. Kristensen notes that China's stockpiles of fissile material are insufficient to support the higher estimates of its inventory of nuclear weapons that have been put forward by some U.S. and Russian analysts.

25 IPFM, 2013, pp. 93–94, posits a notional nuclear warhead design that requires 4 kg of plutonium and 25 kg of HEU, an estimate that is based on publicly available information about U.S. and Soviet fissile material stockpiles and the number of nuclear weapons the two countries deployed during the Cold War.

26 Victor Gillinsky and Henry Sokolski, "How France Is Fueling Japan and China's Nuclear 'Race,'" *National Interest*, November 6, 2015.

27 "Chinese Reprocessing Plant to Start up in 2030," *World Nuclear News*, September 24, 2015.

Conclusions

In the case of the financial resources, China has the ability to adjust priorities within the military establishment, and even significantly reduced economic growth is unlikely to impinge on the quantitative or qualitative development of nuclear capabilities through 2030. (An economic collapse or widespread disorder could, however, change the picture.) China's stockpile of fissile materials, although less certain, appears to limit the possibility of a nuclear breakout, or massive Chinese nuclear expansion, that might see the country pursue parity with the United States and Russia. However, the stockpile would probably permit more modest growth, which could nevertheless prove significant strategically, as we discuss in Chapters Nine and Ten. Given the available resources, the range of adjustments discussed in the preceding chapters—which could see China effectively hold the line at modest improvements to its nuclear survivability or embark on more-significant changes to inventory size and quality—are well within the limits of the nation's capabilities.

CHAPTER NINE

Outputs: Potential Developments in China's Nuclear Future

While the previous chapters summarized the current state of China's nuclear policies and forces and analyzed key drivers of China's nuclear modernization, this chapter examines potential future outcomes. It begins with an examination of six specific changes that could occur to Chinese policy, force structure, or operational practice: adding broader caveats on or modifying China's no-first-use policy; modifying or ending the lean-and-effective formulation and accelerating weapon building; moving toward limited warfighting capabilities and concepts; creating a nuclear triad; establishing a Chinese missile defense system; and incorporating new technologies, such as HGVs and space-based early warning systems. Some of these are more or less likely than others, but all are possible under certain conditions, and all would be consequential. In each case, we address relevant Chinese literature or commentary on the subject, the Chinese logic for and against change, the conditions that might the outcome in question, and the consequences should the development come to pass—a question we address further in the chapter following this.

China's Discussions of the No-First-Use Policy

Of the potential developments considered, perhaps none has been discussed more than modifying China's long-held no-first-use policy. This does not, however, necessarily make this the most likely aspect of China's nuclear policy or programs to change in the coming years. It may, rather, reflect the foundational nature of the policy, together with the important implications that flow from either maintaining or revising it. Ultimately, China is highly unlikely to abandon no-first-use formally but could effectively redefine it by adding caveats or increasing the ambiguity (already considerable) with which it is discussed.

A number of Chinese analysts have raised questions about the circumstances under which China might, or should, consider deviating from its no-first-use policy. In a 2005 article, Fudan University's Shen Dingli argued that the U.S. military's development of precision-guided weapons and their potential use against nuclear assets "begins to blur the boundary" between conventional and nuclear weapons. This, he says, has

put China's no-first-use policy "under unprecedented pressure" and had "stirred up a debate on the validity of NFU [no-first-use]."[1] Major General Peng Guangqian has argued that a conventional attack on a country's nuclear forces could be considered equivalent to the first use of nuclear weapons: "On the surface, this is merely a conventional attack, but in effect, its impact is little different than suffering a nuclear strike and incurring similarly heavy losses." As a result, he argues, the party suffering the attack would "find it difficult to refrain from a nuclear counterattack."[2] Others have made similar comments about conventional strikes against China's strategic command-and-control structure.[3]

Comments by outspoken retired military figures have occasionally triggered speculation about whether China would consider employing nuclear weapons to protect core interests even when an enemy has not used nuclear weapons first. In 1995, General Xiong Guangkai, former deputy chief of the general staff of the PLA, told a U.S. official that China would consider using nuclear weapons in a conflict over Taiwan. Then–U.S. ambassador Chas Freeman said later that Xiong's statement was made "in a deterrent context and it is consistent with no first use."[4] In 2005, Major General Zhu Chenghu said, "if the Americans draw their missiles and position-guided ammunition on to the target zone on China's territory, I think we will have to respond with nuclear weapons."[5] Beijing later distanced itself from Zhu's statement and reiterated its commitment to no-first-use.[6] It is, however, possible that some Chinese strategists may share Zhu's views.[7]

Since 2013, a number of Chinese articles have suggested that China should tailor its no-first-use policy in ways that protect China's core national interests.[8] Shen Dingli,

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1 Shen Dingli, "Nuclear Deterrence in the 21st Century," *China Security*, Vol. 1, 2005.

2 Rong Yu and Peng Guangqian, "Nuclear No-First-Use Revisited," *China Security*, Vol. 5, No. 1, 2009, p. 85.

3 Interviews with Chinese strategists, China, 2006.

4 Freeman's statement is quoted from Chu Shulong and Rong Yu, 2008, p. 175.

5 Joseph Kahn, "Chinese General Threatens Use of A-Bombs if U.S. Intrudes," *New York Times,* July 15, 2005.

6 The Chinese Foreign Ministry stated that China "will not first use nuclear weapons at any time and under any condition" ("Beijing Says General's Words His Own," Xinhua, July 17, 2005, and "China Affirms 'No First Use' Nuke Policy," *China Daily*, July 22, 2005).

7 For views on Zhu's statement by three Chinese military thinkers, see Pan Zhenqiang, "China's Insistence on No-First-Use," *China Security*, Vol. 11, 2005; Shen Dingli, 2005, pp. 10–14; and 孙向丽 [Sun Xiangli], "China's Nuclear Strategy," *China Security*, Vol. 1, 2005. Zhao, for example, also writes of using nuclear weapons "to maintain the unity of the nation, territorial integrity, and national dignity." See Zhao, 2005, pp. 42–43, and Chase, Erickson, and Yeaw, 2009, p. 98.

8 龙兴春 [Long Xingchun], 〈中国核政策, 不妨讲清楚〉 ["There Is No Harm in Speaking Clearly About Chinese Nuclear Policy"], 《环球时报》 [*Global Times*], January 15, 2013; 王大可 [Wang Dake], 〈中国核政策与核心利益〉 ["China's Nuclear Policy and Core Interests"], China.org, January 18, 2013; 〈鹰派少将称核心利益受根本危害时中国或用核武〉 ["Hawkish Major General States That When China's Core Interests Are Fundamentally Threatened, China May Use Nuclear Weapons"], *Duowei News*, April 17, 2013; 沈丁立 [Shen Dingli],

for example, argues that China's neighbors would be less likely to violate China's sovereignty in territorial disputes if Beijing did not explicitly take the use of nuclear weapons off the table in such disputes.[9] Others argue that Beijing should define mainland attacks that might cause mass casualties—such as attacks on the Three Gorges Dam—as constituting "first use."[10] Although China has pledged never to use nuclear weapons against a nonnuclear state, some Chinese analysts also contend that a country that is allied with a nuclear weapon country, houses nuclear weapons, or provides basing for a nuclear adversary should not be seen as a nonnuclear country. Most of the articles accept no-first-use in principle. They argue for specific exemptions, such as attacks on nuclear weapons or on the Three Gorges Dam or, alternatively, advocate a greater degree of ambiguity to achieve a broader deterrent effect.[11]

These articles do not represent the Chinese government's official position. Most of the articles cited above are either by academics or retired military officials, and most likely represent only the most hawkish views within the strategic community. Beijing has repeatedly affirmed its adherence to no-first-use principles.[12] Rather, these articles highlight the frustration some Chinese strategists feel about China's current inability to use diplomatic and conventional military means to successfully resolve territorial disputes in China's favor. And they suggest that at least some see nuclear weapons as a potential source of leverage that China has not fully exploited because of its adherence to the no-first-use policy. Indeed, some believe that Chinese nuclear forces should be employed to deter conventional attack, although that would require a dramatic increase in the number of weapons and improvement in their quality.[13]

In a 2015 article on no-first-use, Pan Zhenqiang, a retired PLA major general and professor at PLA National Defence University's Institute for Strategic Studies, suggests that support for abandoning the policy, which he says accords with rising nationalist sentiment, can be found within the military. Pan, who argues forcefully for maintaining the no-first-use policy, says that those who would abandon the policy see it as having failed to deter U.S. containment and the encirclement of China. Further, they see mid- and small-sized countries destabilizing the region by leaning on U.S. support and provoking China. Ultimately, they argue, "China must consider establishing

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〈改善核威慑, 吓阻对我主权挑衅〉 ["Improve Nuclear Deterrence, Prevent Provocations to Our Sovereignty"], 《环球时报》 [*Global Times*], August 2, 2013b; 乔良 [Qiao Liang], 〈专家: 中国应学习俄罗斯 用核武保证安全发展〉 ["Expert: China Should Learn from Russia, Use Nuclear Weapons to Ensure Secure Development"], 《中国航空报》 [*China Space News*], January 17, 2014.

9 Shen Dingli, 2013.

10 Long Xingchun, 2013.

11 One author (Qiao Liang, a noted hawk and author of *Unrestricted Warfare*) advocates abandoning no-first-use (Qiao Liang, 2014).

12 See, for example, Yao Yunzhu, 2013.

13 Xu Weidi, 2016, p. 39.

power on the basis of a first-use policy, as Russia does, before it can compete with the United States effectively and protect China's sovereignty and territorial unity."[14] However, even most Chinese analysts who would like to see some adjustment of the policy reason that China is unlikely to abandon its no-first-use policy anytime soon. Shen Dingli, for example, argues that "the political cost to the Chinese leadership due to such a change would be prohibitive, which acts as a real restraint against China's altering its professed position."[15]

And many officials would agree with the logic of Pan Zhenqiang, who offers five reasons Beijing should continue to adhere to the no-first-use policy. First, he said, the no-first-use policy is consistent with China's views of nuclear no-first-use as instruments of deterrence, not tools for warfighting. Second, even modifying no-first-use would have an immediate effect on "the future strategic stability between China and the United States."[16] Third, changing the no-first-use policy would undermine China's broader arms control policy. Fourth, it would "tarnish China's international image . . . and would not be conducive to its overall strategic goal of building an enduring peaceful and a stable international environment."[17] And fifth, "a change of the no-first-use approach would further threaten and complicate, rather than stabilize, the situation across the Taiwan Strait."[18] Xu Weidi, a senior colonel at China's National Defence University, puts the case more simply. Adding conditions to the no-first-use policy would be, he says, "effectively equivalent to the first use of nuclear weapons. . . . The United States does not say that it supports the unconditional first use of nuclear weapons."[19]

China continues to adhere to a no-first-use nuclear policy and deterrence through assured retaliation. It is unlikely to formally disavow the no-first-use policy over the next 15 years. Increased discussion of caveats to the policy by strategists or military figures or threats by retired officers that China might use nuclear weapons first in the face of some particular challenge would, however, undermine the credibility of the no-first-use policy. Such actions might have some of the same effects or implications as abandoning the no-first-use policy, especially given skepticism within some U.S. official circles about the likelihood China would actually strictly follow the policy in the event of war. Official amendments to the no-first-use policy would be most likely to occur in response to a significant deterioration in China's external security position, especially

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14 潘振强 [Pan Zhenqiang], 〈中国不首先使用核武器问题研究〉 ["Research on the Problem of China's No-First-Use"], 《空天力量杂志》 [*Air and Space Power Journal*], Spring 2015.

15 Shen Dingli, 2005, p. 12.

16 Pan Zhenqiang, 2005, p. 6.

17 Pan Zhenqiang, 2005, p. 7.

18 Pan Zhenqiang, 2005, p. 7.

19 Xu Weidi, 2016, p. 38.

if that deterioration included security crises involving the United States. Alternatively, modification of no-first-use could come in the context of disputes with other regional powers, such as India, Japan, or Russia, especially if China's adversary were to threaten strikes against high-value Chinese targets. Regardless of any changes to the no-first-use policy, however, Chinese scholars suggest that Beijing would approach any actual decision to use nuclear weapons with great caution and that such a decision would only be made under the most extreme circumstances.[20]

Accelerated Buildup of Nuclear Systems

As noted previously, China's strategic nuclear modernization already includes a significant expansion of missile and strategically deliverable warhead numbers, in addition to qualitative improvements. Heightened perceptions of external security threats, together with greater confidence about its own domestic resources and capabilities, could encourage China to accelerate further the expansion of its nuclear inventory and, possibly, to move away from the lean-and-effective formulation for nuclear sufficiency. Specific external drivers could be significantly increased tensions in U.S.-China relations or heightened security competition involving China, India, and Pakistan or, alternatively, China and Russia.

While most analysts do not favor dramatically increasing the size of China's nuclear arsenal, which would be costly, this has not been ruled out. According to Li Bin, who does not favor a buildup, the logic of building a larger inventory would be that the

> buildup option is so mathematically simple to understand and so certain to work. So, in the Chinese debate, this idea would easily win some support from nontechnical people. Another advantage is that the buildup would be visible to the outside and would therefore discourage any first strike against China.[21]

Shen Dingli suggests that China should increase its nuclear capabilities for less-tangible but, in a sense, more-traditional reasons: national status, influence, and respect. Shen argues that, despite improvements to Chinese military capabilities, its efforts have been insufficient to deter neighbors from challenges to territorial sovereignty. Only by bolstering efforts to further strengthen both conventional and nuclear capabilities can China avoid such challenges and protect its sovereignty. He writes, "in actuality, we have not yet sufficiently developed our capabilities. . . . Now is the time

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[20] For example, Rong and Peng state that a decision to launch nuclear weapons would be "only imaginable if core national interests are in peril, such as the survival of the state or nation" (Rong Yu and Peng Guangqian, 2009, p. 88).

[21] Quotation from Li Bin (2001) is cited in Rong Yu and Peng Guangqian, 2009, p. 174.

to greatly improve our nuclear deterrent in keeping with increased national power."[22] Shen believes this can be accomplished without embarking on a costly nuclear arms race with the United States, "but it will be necessary to redouble the increase of our strategic strike forces if we want to convince our adversary to abandon any misguided efforts at armed intervention in our sovereign [affairs] and in our territorial unity."[23]

In December 2014, China's *Huanqiu Shibao* newspaper summarized comments from a roundtable on "How Many Nuclear Weapons China Needs." None of the participants suggested a major nuclear "breakout" or parity with the United States or Russia, but opinions—and more important, the standards employed to judge sufficiency—varied significantly. Some focused almost exclusively on China's retaliatory capacity and the need for continued modernization in light of U.S. missile defenses and strike capability—a line of argumentation consistent with China's lean-and-effective formulation. In contrast, Yang Chengjun, a researcher associated with the Council for National Security Policy Studies, listed seven criteria that should be considered in sizing the inventory, including the resources available to China. He concluded that the inventory should not only be capable of meeting retaliatory requirements but also be "commensurate with China's standing as a country and the international obligations it shoulders."[24]

In the same meeting, Teng Jianqun, director of the Arms Control and International Security Research Center at the China Institute of International Studies, said that he too had heard "certain new demands, such as 'build a nuclear force commensurate with China's great power status.'"[25] Having made this observation, Teng's own views appeared skeptical, if somewhat ambiguous. While saying that "such calls are worthy of everyone's consideration," he stipulated that China aimed for a small but highly capable force and that, in any case, it was unclear how many weapons would be commensurate with "great power status."[26] Finally, Yang Lianxin, former deputy director of the naval nuclear safety bureau, injected a parochial naval perspective, suggesting, "it would be a strategic mistake not to fully develop an underwater nuclear force."

These views may or may not necessarily represent mainstream views within China's strategic community. Li Bin, for one, has recently argued against any dramatic expansion of China's force structure, saying that qualitative improvements trump the expansion of warhead numbers in addressing issues related to vulnerability and stra-

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22 Shen Dingli, 2013b.

23 Shen Dingli, 2013b.

24 "PRC Experts Discuss 'How Many Nuclear Weapons China Needs,'" *Huanqiu Shibao*, December 18, 2014.

25 "PRC Experts Discuss . . . ," 2014.

26 "PRC Experts Discuss . . . ," 2014.

tegic stability.[27] But the very existence of a forum on the appropriate sizing China's nuclear forces, as well as the participation of established figures in China's strategic community, is significant.[28] And Li Bin's public defense of a lean nuclear force structure may reflect pressure on China's limited approach to force building as much as broad support for it.

In "right sizing" its nuclear forces, China is likely to key primarily on its retaliatory capability. The speed and scale of growth in its inventory are, therefore, likely to depend largely on developments in U.S. missile defenses and strike capabilities. Nevertheless, some developments could bring considerations of status and influence more powerfully into the mix and strengthen the voice of those who might seek a more robust nuclear force. As we observed in Chapter Six, China may or may not be willing to accept Indian nuclear parity in the same way that it does U.S. or Russian nuclear superiority. The rapid growth in India's nuclear arsenal could, even without significantly exacerbated tensions, lead China to accelerate its nuclear force building. More broadly, China may pay more attention to escalation management and control as its national strength enables it to develop a broader range of capabilities. And increased territorial tensions in East Asia, especially in the event Beijing encounters setbacks and frustrations, could also strengthen calls for increased nuclear efforts.

Nuclear Warfighting Capability or Concepts

China has traditionally eschewed nuclear warfighting concepts in favor of deterrence through an assured capability to survive enemy nuclear strike and launch a punishing counterattack. However, Chinese strategists have debated other approaches in the past, and there is at least some discussion of limited warfighting concepts today.[29] There are a number of reasons to consider the possibility that China could move toward

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[27] Li Bin argues that the only rationale for substantial expansion of the force structure would be a quest for status or primacy like that pursued by the United States and the Soviet Union during the Cold War, with all the attendant pernicious consequences (李彬 [Li Bin], 〈相比数量技术是王道：理解中国核思维对战略稳定的追求〉 ["Compared with Quantity, Technology Is King: Understanding China's Thinking on the Pursuit of Strategic Nuclear Stability"], 《澎湃新闻》 [*The Paper*], April 2, 2016).

[28] "PRC Experts Discuss . . . ," 2014.

[29] Retired Major General Pan Zhenqiang highlights the potential dilemma of how China, with a largely countervalue retaliatory strategy, might respond to a limited attack on naval targets at sea (or some other military target). "Under these circumstances," he asks, "would our nation's leaders be able to quickly make the decision to strike the ultimate targets, causing hundreds of thousands or even millions of casualties?" Expanding the menu of targeting options and rungs on the nuclear ladder might, Pan reports, allow China to mitigate the dilemmas posed by limited nuclear use, but would require China to adjust its force structure and might be affect strategic stability (Pan Zhenqiang, 2015).

such concepts in the future, albeit probably only partially and perhaps not even fully intentionally.[30]

Given that various writers in the United States and elsewhere have used the term *nuclear warfighting* in different ways, it is important to establish parameters for its use here. In the Chinese context, we do not mean a strategy centered on a massive first strike to eliminate or severely degrade an enemy's ability to strike back with nuclear weapons. Indeed, none of the available evidence indicates that China is interested in pursuing the capabilities that would be required for a disarming first strike against a major power nuclear adversary. Instead, the term refers to an approach that involves conducting multiple waves of strikes of various scales against different types of targets in a nuclear conflict of extended duration, designed to control escalation or to compel an end to hostilities on favorable terms. Although Chinese writings already call for the ability to conduct multiple waves of attacks, China has maintained minimal capabilities to achieve this objective and has only the crudest of counterforce capability.

As noted previously, engineers and procurement officials are likely to "spin-on" technologies relevant to limited nuclear warfighting capability out of the conventional and into the nuclear missile force unless there is a conscious decision made to prevent it—and such decisions would likely have to come from the highest political levels.[31] Relevant technologies could include improved accuracy, higher readiness levels, rapid response capability, and maneuvering reentry vehicles. Importantly, such capabilities are not limited only to warfighting but might also help China improve its nuclear retaliatory capabilities in ways that are more consistent with its current approach to nuclear deterrence.[32] At the same time, the fact that these capabilities have existed for years on the conventional side means that commanders and other officers who have previously worked with conventional missiles may bring some ideas about how to fight conventional missile campaigns to the nuclear missile force.

In addition to technological drivers that might make such a shift in approach easier, dynamics with regional nuclear powers might provide motivation. Chinese analysts have noted Russia's thinking about using tactical nuclear weapons in a warfighting role. Trends in South Asia might affect Chinese thinking more directly. Pakistan has explicitly embraced nuclear warfighting and this, in turn, puts pressure on India to modify its strategy of massive retaliation in favor of a flexible response. Whether in

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30 Most notably, see Johnston, 1995–1996.

31 Spin-on would be most likely to occur when the PLA Rocket Force deploys or is likely to deploy nuclear and conventional missiles of approximately the same ranges. This would most likely emerge with respect to MRBMs and IRBMs, because the Rocket Force would be responsible for conventional and nuclear versions of MRBMs and IRBMs; it would not be relevant with respect to short-range ballistic missiles, so long as they are all conventional, or to ICBMs, so long as they are all nuclear.

32 For example, a higher level of readiness or a rapid-response capability could increase survivability, and maneuvering reentry vehicles could strengthen China's ability to counter missile defenses. Nonetheless, such improvements would also give China at least a somewhat greater warfighting capability.

response to Pakistan or simply as a function of bureaucratic inertia, India is acquiring some of the capabilities that would be necessary for warfighting. Indian moves to adopt a nuclear warfighting doctrine (or to acquire significant nuclear warfighting capability without formally changing doctrine) could further pressure China to do the same—especially if relevant Indian systems were deployed near disputed areas.

A shift in the direction of warfighting concepts or capabilities would not necessarily be particularly rapid or dramatic. It also would not necessarily represent as fundamental a departure from current Chinese concepts and capabilities as some observers have assumed. Chinese military publications already incorporate some elements of a warfighting approach. For example, Chinese military writings on nuclear counterattack campaigns envision the possibility of nuclear counterattack campaigns of various scales, potentially small or large, depending on the circumstances.[33] They suggest that a wide range of targets could be struck, including enemy command centers, communications nodes, transportation hubs, military bases, political and economic centers, important industrial facilities, and other strategic and campaign targets.[34] Chinese military publications also suggest that multiple waves of strikes might be required and that some of China's nuclear missile forces would be held in reserve to deter further escalation or to launch follow-on strikes.[35]

A more concerted move to gain technologies consistent with limited nuclear warfighting would give Beijing a somewhat wider range of options during crises or conflicts. It might also give rise to debates among China's military and civilian nuclear specialists about more-fundamental questions, such as the scope of nuclear deterrence and possible amendments to China's no-first-use policy. There is little reason to believe that China would reject its long-standing approach to nuclear deterrence outright. On the other hand, it is possible that some Chinese strategists might conclude that a more robust nuclear force and a more flexible strategy could provide additional leverage and deterrent power during crises.

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[33] According to one Chinese military publication, for example, apart from dividing nuclear counterstrike campaigns into those that are executed independently by the PLA Rocket Force or jointly with the other services, such campaigns may also be categorized as large-scale [*da guimo he fanji zhanyi*] or small-scale nuclear counterattack campaigns [*xiao guimo he fanji zhanyi*]. See Bi Xinglin, 2002, p. 384.

[34] Note that this list of targets includes "countervalue" targets (political and economic centers, industrial assets) and what many U.S. strategists would refer to as "countermilitary" targets (bases and command and control capabilities) but does not appear to envision disarming or damage-limiting strikes against enemy nuclear "counterforce" targets (such as the enemy's ICBMs).

[35] Follow-on strikes could consist of repeat strikes against targets that had not been destroyed by the initial nuclear strike or could be carried out "to maintain a huge amount of pressure and psychological fear against the enemy." See Yu Jixun, 2004, p. 307.

Investing in a Nuclear Triad

As Chinese nuclear capabilities continue to improve, China may face the question of whether it should acquire a nuclear triad like those of the United States and Russia. Chinese missile force publications sometimes suggest that a joint nuclear counterattack campaign could involve naval and air units in addition to China's strategic missile force. However, most outside observers believe that PLAAF does not possess a dedicated strategic bomber force and currently lacks a nuclear mission.[36] The writings of some PLAAF authors appear to confirm this assessment. For example, in comparing PLAAF to the U.S. Air Force, one Chinese air force analyst notes that, in contrast to the U.S. Air Force's role in the American nuclear triad, which includes its strategic bombers and silo-based ICBMs,

> China's "air-based" nuclear force is a blank space [*kongbai*], and China's "ground-based" nuclear force is under an independent branch, one that, due to its long history of building and development, plays a role no less important than that of the air force in China's national strategic power.[37]

Currently, PLAAF's quest to become a "strategic air force" places a premium on its ability to contribute to the strategic deterrence mission of China's military. In Chinese writings on military strategy, however, strategic deterrence is not synonymous with nuclear deterrence. Indeed, many Chinese strategists argue that the role conventional military forces play in strategic deterrence is increasing. PLAAF's growing capabilities to conduct conventional offensive operations enhance its ability to contribute to China's overall strategic deterrence posture.

Although PLAAF authors have written about the nuclear role of other countries' air forces, there is no consensus evident in the available writings about whether PLAAF needs its own nuclear deterrence and nuclear strike capabilities to become a truly strategic air force. Some Chinese air force strategists point out that the modern

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[36] For example, DoD's annual reports on Chinese military power state that PLASAF and PLAN have nuclear deterrence missions and capabilities but do not attribute a nuclear mission to PLAAF. Although some of the reports have stated that Chinese cruise missiles could be capable of carrying nuclear weapons, they have not indicated that any nuclear-armed cruise missiles are currently deployed with PLAAF. Similarly, during the question-and-answer session following a January 2014 U.S.-China Economic and Security Review Commission hearing on Chinese military modernization, a senior analyst from NASIC indicated that PLAAF is currently assessed as lacking a nuclear mission but that one would be feasible. See U.S.-China Economic and Security Review Commission, "China's Military Modernization and Its Implications for the United States," hearing before the U.S.-China Economic and Security Review Commission, January 30, 2014.

[37] Huang Sujian and Zhang Zhengping, 〈美国战略空军内涵的发展及其对我空军建设的启示〉 ["The Development of the Essential Properties of the U.S. Strategic Air Force and Its Lessons for China's Air Force Building"] in 朱晖 [Zhu Hui], ed., 《战略空军论》 [*Strategic Air Force*], Beijing: Blue Sky Press, 2009, p. 280.

air forces of nuclear powers typically have nuclear strike capabilities.[38] According to these sources, air force platforms also offer some advantages over those of the other services: "Compared with ground-based ballistic missiles and nuclear submarines, [air force long-range attack forces] offer advantages in concealment, suddenness, controllability, and flexibility, and its rapid reaction capability is stronger."[39] Other PLAAF analysts appear to be somewhat less concerned with nuclear capabilities, noting that the trend of worldwide air force developments is toward improving capabilities for launching long-range conventional precision strikes.[40]

PLAAF analysts, however, do see a clear need for modern and capable bombers. They see missiles and manned aircraft as complementary, noting that, although missiles possess a number of desirable attributes and are superior to bombers in some ways, bombers are superior to missiles in others. They note, for example, that bombers are reusable platforms, while missiles can be used only once. PLAAF analysts point out that long-range bombers can be useful not only for conventional strike missions but also for deterrence or intimidation of potential rivals and to send messages diplomatically.[41] Russia, they note, employs long-range bombers to perform these functions.[42] Some PLAAF analysts call for China to develop strategic bombers for status reasons: "China, as a major country in the world, has a need, and also an urgent need, to develop its own strategic bombers to boost the strategic assault power of its air force."[43]

And at least two military officers at high-profile military academic institutions have publicly called for China to field a next-generation nuclear-capable bomber. Colonel Fu Guangwen, a professor at PLA National Defence University, argues that China's next-generation bomber should be capable of conducting not only conventional preci-

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38 胡建生 刘进军 [Hu Jiansheng, and Liu Jinjun], 〈战略空军应重视空中远程进攻力量建设〉 ["A Strategic Air Force Should Attach Importance to Building Long-Range Offensive Air Power"], in 朱晖 [Zhu Hui], ed., 《战略空军论》 [*Strategic Air Force*], Beijing: Blue Sky Press, 2009, p. 119.

39 Hu Jiansheng and Liu Jinjun, 2009, p. 120.

40 As Dong Wenxian puts it, "the strategic air forces of various nations are equipped with nuclear weapons, including nuclear bombs and nuclear cruise missiles, but no nation dares to cross the nuclear threshold lightly, and the main mission of nuclear weapons is strategic deterrence" (Dong Wenxian, 〈攻防一体: 战略空军的基本特征〉 ["Part Two of the 'Strategic Air Force' Series: Integration of Offense and Defense: The Basic Characteristics of a Modernized Strategic Air Force"], 《空军报》 [*Air Force News*], February 16, 2008, p. 2).

41 王明亮 杨芋杰 汪旭东 郭金锁 [Wang Mingliang, Yang Yujie, Wang Xudong, and Guo Jinsuo], 〈关于战略空军的若干命题〉 ["A Few Propositions Concerning the Strategic Air Force"], in 朱晖 [Zhu Hui, ed.], 《战略空军论》 [*Strategic Air Force]*, Beijing: Blue Sky Press, 2009, p. 64.

42 Wang Mingliang et al., 2009, p. 64.

43 施克如 刘刚马宏刚 [Shi Keru, Liu Gang, and Ma Honggang], 〈提高空军战略作战能力〉 ["Increase the Strategic Combat Capability of the Air Force"], in 朱晖 [Zhu Hui], ed., 《战略空军论》 [*Strategic Air Force*], Beijing: Blue Sky Press, 2009, p. 115.

sion strikes but also nuclear attacks.[44] In April 2016, an article on the *People's Daily* website cited Western press reports claiming China had begun design work on a strategic bomber.[45] In the article, Senior Colonel Du Wenlong, a researcher at the Academy of Military Science, argues that it should have three characteristics:

> (1) long range and the capability to conduct intercontinental strikes; (2) a large bomb-load capacity (with a munitions capacity of at least 10 tons) and the ability to conduct highly effective strikes; and (3) the ability to employ nuclear weapons—the strategic bomber is an important part of the strategic strike triad.[46]

The probability of China moving toward a triad would be increased by a number of possible factors. There could, for example, be mutually reinforcing dynamics between it and several of the other potential developments discussed previously. Moving to expand the inventory, toward limited warfighting concepts, or toward a broader view of the function of nuclear weapons and the modification of no-first-use could all increase the probability that PLAAF might gain a nuclear bomber mission. Similarly, the development of a triad would make an increase in overall numbers and the broadening of views on the functions of nuclear weapons more likely. Given the service issues involved, anything that increased interservice rivalry might also contribute to this outcome. If, for example, structural reform produced an expanded role and higher profile for the air force, navy, and Rocket Force within the PLA, as appears to be occurring, they might compete more vigorously for roles and missions—including those in the nuclear domain.

Establishing a Chinese Missile Defense System

China has been developing missile defense technology and could potentially proceed with deployment.[47] To date, Beijing has conducted four midcourse missile defense interception tests.[48] China's antisatellite tests have employed the same kill vehicle, and

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[44] "Senior Officer: China's Next-Generation Strategic Bomber Combat Radius Needs to Cover Second Island Chain," *People's Daily*, December 20, 2013.

[45] 〈专家: 中国新型战略轰炸机至少要达到B-2水平〉["Specialist: China's New Strategic Bomber Should, at a Minimum, Match the Performance of the B-2"], *People's Daily* online, April 29, 2016.

[46] "Specialist: China's New Strategic Bomber Should . . . ," 2016.

[47] This section draws heavily from Twomey and Chase, 2015.

[48] China conducted its first missile defense interception test in January 2010, then additional tests in January 2013, July 2014, and November 2015 ("China Conducts Test on Ground-Based Midcourse Missile Interception," Xinhua, January 11, 2010; "China Carries Out Land-Based Midcourse Missile Interception Test," Xinhua, January 28, 2013; Zachary Keck, "China Conducts Third Anti-Missile Test," *The Diplomat*, July 24, 2014; 〈中国中段反导拦截试验现场画面首次公布〉["China Makes Public a Midcourse Missile Intercept Test for the First Time"], Tiexue Net, July 25, 2016).

the technology for the two tasks overlaps considerably (with the chief distinctions being the relative ease of intercepting satellites and, depending on the specific target, the required altitude).[49]

According to Li Bin, these tests "demonstrated that the country had acquired [hit-to-kill] technology, but that does not mean China has a conceptual missile defense system that can target incoming missiles from any specific country."[50] Li suggests that there are at least three paths Beijing could follow in the future: (1) continue to refine its missile defense technology while refraining from deploying an operational system; (2) deploy an NMD system intended to protect the entire country, at least from a small-scale ballistic missile attack; or (3) deploy a small number of missile defense interceptors in a point-defense role to provide some level of protection for key strategic targets, such as its ICBMs or strategic command and control facilities.[51]

If China were to deploy a missile defense system, perhaps the least likely outcome would be deployment of a full-scale NMD system. Li Bin argues that, if China wants to limit damage from U.S. strategic missiles, it would need many more interceptors than the United States would need for the same purpose.[52] Instead, a point-defense system designed to defend a handful of small areas against ballistic missile attack would seem more logical and affordable. According to Li, such a system "could also be used to protect some of China's strategic nuclear weapons and increase their survivability."[53] The employment of midcourse missile defense interceptors might similarly be positioned to protect China's nuclear forces. China's approximately 20 silo-based ICBMs would seem to be the best candidates for this protection, given that China sees them as more vulnerable to a first strike than its road-mobile ICBMs are. Employing missile defense in this role could be less difficult—and less expensive—than even a limited NMD system.

Chinese analysts argue that deploying a missile defense could—unlike U.S. deployment—strengthen strategic stability. Given the large number and sophistication of U.S. strategic missiles, the U.S. ability to conduct nuclear retaliatory strikes would not be in question, even with the deployment of Chinese missile defense. Consequently, China's deployment would not undermine U.S. nuclear deterrence or prompt the United States to deploy additional offensive capability—unless the United States does consciously seek the capability to conduct a disarming first strike. A senior colonel with the PLASAF Command College suggests that Chinese missile defenses might

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49 Tamir Eshel, "Expanding Strategic Defense in Space—China's Missile Interceptors and Satellite Killers," *Defense Update*, July 28, 2016.

50 Li Bin, "What China's Missile Intercept Test Means," Washington, D.C.: Carnegie Endowment for International Peace, February 4, 2013.

51 Li Bin, 2013.

52 Li Bin, 2013.

53 Li Bin, 2013. For a similar point made a decade earlier, see Li Bin, undated.

enable China to "maintain a relatively small number of nuclear weapons, given its increasing defensive capabilities."[54] Hence, used in a judicious and strategic way, Chinese missile defenses could potentially decrease Chinese force requirements and thus reduce the probability of arms racing.

But to the extent that either symbolic motivations or bureaucratic processes drive Chinese procurement, there is a chance that Beijing might simply deploy capabilities as they become operationally viable, regardless of other considerations. While not likely to create the same kind of structural instability that U.S. missile defenses could, Chinese missile defenses might simply become another means of competition. In July 2016, just days after South Korea and the United States announced the deployment of THAAD to the Korean Peninsula, China posted videos of its first missile defense test in 2010 and briefed reporters on Chinese missile defense progress. According to Senior Colonel Chen Deming, who has been involved in China's missile defense program since its inception in 2007, "Missile defense is the strong shield of strategic defense and an important bargaining chip in the great power game. It holds the 'commanding heights' in world military competition, and the Chinese people must have their own missile defense system."[55]

Incorporating New Technology

Finally, China will also likely face questions on how to incorporate and use new technologies to enhance its nuclear deterrent. Two examples of Chinese technology in development that could shape Chinese nuclear policy and its nuclear capabilities are HGVs and a space-based early warning system.

China is developing HGVs, an effort that appears to be a high priority, given that it has conducted seven HGV flight tests since 2014.[56] Chinese media have characterized the HGV as an asymmetric "assassin's mace" weapon. One senior colonel explained that the new weapon could allow longer-range precision strikes, including against targets at sea.[57] How China arms its HGVs will have critical strategic implications. Deploying nuclear-armed HGVs would likely strengthen China's confidence in its nuclear retaliatory capability, since HVGs would likely be better at penetrat-

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54 "China's Missile Interception Test Enhances Strategic Deterrence," *People's Daily*, January 30, 2013.

55 〈反导试验专家陈德明: 科技强军尖兵〉 ["Missile Defense Expert Chen Deming: Build a Strong, Elite Force Through Science and Technology"], 《瞭望》 [*Liaowang*], July 25, 2016.

56 Franz-Stefan Gady, "China Tests New Weapon Capable of Breaching U.S. Missile Defense Systems," *The Diplomat*, April 28, 2016.

57 〈中国高超音速武器背后的玄机〉 ["The Mystery Behind China's Hypersonic Weapon"], Xinhua, January 16, 2014.

ing adversary missile defenses.[58] Potentially, this could enable China to counter missile defenses with a smaller number of systems and mitigate (to an extent) concerns about a regional arms race. The deployment of both nuclear and conventional HGVs to the same units, on the other hand, would be of greater concern. In a crisis, this could lead to ambiguity about whether particular actions were intended as nuclear or conventional signals. In a conflict, U.S. forces might have high incentives to strike conventionally armed HGVs before they could be used. But it might be difficult to distinguish such weapons from HGVs armed with nuclear warheads (especially if both had flushed from garrison), creating the possibility of an accidental attack on Chinese nuclear forces. Deployed HVGs could also provide a capability for limited nuclear warfighting because they could be launched in flexible, small salvos and still have an expectation of penetration.

A second type of new technology that could be deployed is a space-based early warning system.[59] According to a June 2014 segment on China's Shenzhen TV, China is working on a space-based early warning system but, according to the same report, is unlikely to have fully resolved a number of problems in the next eight to ten years. The financial and technical hurdles design and launch issues, as well as protection from interference, are considerable.[60] Yan Shiqiang, a professor at PLAAF's Early Warning Academy, notes that any early warning system must be able to detect an increasing range of targets, face a complex electromagnetic environment, and survive various types of attacks.[61] The establishment of the Strategic Support Force, which is responsible for most space missions and has former Second Artillery officers at the helm, may provide an important boost for China's early warning prospects. At least in theory, a space-based early warning system, along with improvements in command, control, and communications and rapid-response capabilities, could enable China to consider a launch-on-warning policy at some point in the future, which at least one Chinese military publication states would be consistent with China's no-first-use policy.[62]

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58 "The Mystery Behind . . . ," 2014.

59 朱和平 [Zhu Heping], 〈构建空天预警体系〉 ["Constructing the Air-Space Early Warning System"], in 朱晖 [Zhu Hui], ed., 《战略空军论》 [*Strategic Air Force*], Beijing: Blue Sky Press, 2009, pp. 158–162.

60 〈曝中国反导有三只眼 预警卫星差距超过10年〉 ["Revealed That China Has Three Anti-Ballistic Missile Eyes, Still over Ten Years Away from Early Warning Satellite System"], 凤凰新媒体 [Phoenix TV], June 11, 2014.

61 〈解放军预警能力建设面临多重挑战〉 ["PLA Efforts to Establish an Early Warning Capability Faces Many Hurdles"], 《中国青年报》 [*China Youth Daily*], October 2, 2013.

62 Shou Xiaosong, 2013.

Conclusions

Some of the possibilities discussed above are more likely than others. China is likely to incorporate new technologies into its force structure, assuming they are technically feasible. It is less likely to drop its lean-and-effective standard of sufficiency for force planning. Of course, judgments about probabilities and likelihoods depend in part on where the thresholds are drawn. There could be some movement toward a given outcome, even if not all the manifestations of that particular change become evident. For example, increased nonauthoritative appeals for exceptions to the no-first-use policy could raise new questions about how the policy might be applied in crises, even in the absence of formal policy change. And the PLA could gain greater nuclear warfighting capability without articulating anything that looks like a warfighting strategy.

The potential developments discussed above are interrelated. Any move to attach conditionality to the no-first-use policy could encourage more explicit thinking about warfighting options, since deterrence and retaliation would no longer be the only nuclear operations considered. The emergence of a nuclear triad could also encourage an accelerated building program, given that PLAAF would likely stipulate a minimum inventory, as some in the navy are doing today. Some outcomes could potentially be negatively correlated. For example, a limited missile defense system or the incorporation of new penetration capabilities (including HGVs, decoys, or MIRVed systems) could discourage China from accelerating a buildup of offensive systems, since defenses or penetration capabilities could mitigate the challenges to a secure retaliatory capability. In Chapter Ten, we discuss how different constellations of drivers might produce particular sets of outcomes.

CHAPTER TEN

Contingent Futures

Chinese thinking on nuclear issues has remained relatively stable for decades, and there is little sign that leaders in Beijing anticipate dramatic changes to policy or doctrine. However, as Chapters Four through Six illustrate, global and regional nuclear dynamics, some fed by China's own actions, will place new pressures on Chinese policy and practice. The bureaucratic environment has evolved, providing nuclear constituencies somewhat greater voice, while bureaucratic structures and processes (particularly the prospects for applying technologies and practices associated with China's conventional missile elements to its nuclear forces) are likely to produce forces with increased, if still limited, warfighting capabilities. Developments outlined in Chapter Nine illustrate that there has been an uptick in public discussion of adjustments to force structure and policy, providing some evidence that the factors outlined above may already influence thinking. The establishment of the Rocket Force is emblematic of these changes and will itself have consequences for the future development of China's nuclear forces.

These overall conclusions are probabilistic, and readers should bear in mind that there are strong elements of continuity in China's fundamental thinking on the role of nuclear weapons and the policies that guide nuclear development. This thinking will continue to shape outcomes despite changing circumstances. A variety of changes to capabilities can be accommodated under existing policy frameworks. And while the continued evolution of Chinese forces and thinking is likely—and will have significant strategic implications—policy and doctrinal frameworks are likely to continue limiting the extent and nature of change in many areas.

The primary purpose of this report is to analyze the drivers that will shape Chinese decisionmaking on nuclear issues in the coming years, rather than to develop detailed scenarios or predictions about China's future force structure, doctrine, or policy. Nevertheless, in this chapter, we offer some thoughts on the likelihood of particular developments and, based on them, what China's nuclear forces and posture could look like 15 years from now (or by roughly 2030). After discussing probabilities with regard to individual drivers and sets of drivers, we outline three possible scenarios depicting a range of potential outcomes based on key variables. While these are intended to illustrate how different combinations of drivers could produce different outcomes, they are not designed to be extreme cases or "bookends" for the entire range

of possibilities. Importantly, there are significant changes from current force structure in each. We believe that a scenario assuming full continuity or no significant change in China's force structure and thinking is virtually unthinkable.

Drivers and Probabilities

Most, though not all, of the drivers examined in the preceding chapters are likely to encourage China to continue modernizing and expanding its nuclear forces. Somewhat less clear is whether the pace will remain relatively constant or whether nuclear issues will assume a higher priority and produce accelerated change in force structure and thinking. Given the recent deployment of MIRVed missiles and the deployment or testing of new classes of missiles (especially the DF-26, DF-41, and HGV), acceleration seems, on balance, more likely. While the development of China's capabilities and the evolution of its thinking are likely to have significant strategic implications (outlined further later), a number of factors are nevertheless likely to limit the extent of change.

Although domestic drivers may be less well understood than external drivers in terms of the specific mechanisms by which they could influence policy, they may also be somewhat more predicable in terms of their general impact. Chinese economic growth and defense spending are not likely to be major constraints on China's nuclear modernization. Even reduced rates of Chinese economic growth will provide sufficient funds to allow China to continue to modernize its nuclear force—especially when one considers that it has generally invested less in its nuclear forces than its resources already allow. China's stocks of fissile material are, however, just as likely to constrain a dramatic buildup and make anything resembling a race for parity highly unlikely.

Bureaucratic and organization factors will also push toward the development of a more modern, diverse, and capable nuclear force. Political leaders are likely to play an important role in key *policy* decisions but are also likely to remain less involved in procurement and doctrinal decisions than they were from the 1960s through the 1980s. This will leave greater scope for bureaucratic factors to influence outcomes. The institutional changes discussed previously, especially the creation of the PLA Rocket Force, create a larger and more capable constituency for nuclear weapons. And technological spillovers from China's conventional missile force could enhance China's nuclear missile force and encourage the development of nuclear warfighting concepts.

Domestic factors are, therefore, likely to push in the direction of steady and accelerating, if still measured, evolution of Chinese nuclear forces and thinking, with a relatively high degree of probability. Contingent events—such as the emergence of leaders with dramatically different priorities or economic collapse—could produce significantly different results, but such events have relatively low probability.

Chance, contingency, and a wider range of possibilities would appear possible in the external environment. In that realm, the behavior of two or more actors together—

China and others—will contribute to outcomes. For decades, a mix of cooperation and competition has characterized Sino-American relations, the biggest driver for Chinese nuclear decisionmakers. That mix is unlikely to change fundamentally. However, competition could either be a central aspect of the relationship or a less immediate, more contingent feature of hedging, depending on the tenor of China's relations with its neighbors and the nature of U.S. and, especially, Chinese leadership priorities. Beyond the political relationship, U.S. decisions on strategic capabilities, especially missile defense and conventional strike, will also be important drivers for Chinese nuclear policy. A broad range of considerations, many having nothing to do with China, will shape U.S. strategic decisions. The United States could find itself embroiled in problems elsewhere in the world or focused on domestic priorities. But crises or clashes between Washington and Beijing could also occur, with the probabilities influenced not only by state policies and behavior but also by blind chance, and these could set the U.S. relationship with China on an entirely new track.

China's political and nuclear relations with other states and how these relations influence Chinese nuclear decisionmaking are even less predictable. As we have discussed elsewhere in this report, India and its rapidly evolving nuclear capabilities could be a potentially important driver of Chinese nuclear policy. India's rapid nuclear development confronts China with what is, for it, an entirely new situation: the rise of a new, neighboring nuclear power that is narrowing the gap in capabilities with China and that will ultimately confront Beijing with choices about whether and how to respond. Russia currently plays a relatively modest role in Chinese nuclear thinking, but uncertainties about Russia's long-term political direction, highlighted by recent events in Ukraine and the Middle East, make this too a wildcard. And North Korea, Japan, and Pakistan, as well as Southeast Asian states, could also impinge on Chinese nuclear thinking either directly or through their effects on China's broader international circumstances.

Overall, however, while external variables are inherently unpredictable, there is every indication that most will (like domestic variables) push China in the direction of further modernization and the expansion of its nuclear inventory. Barring an end to North Korean nuclear and missile development—and possibly even if it does occurs—the United States is likely to pursue improved missile defenses. China's willingness to employ coercive means to achieve its territorial ambitions in the South China Sea and East China Sea shows little sign of abating and may further erode U.S. willingness to compromise on key strategic issues. Japan continues to strengthen missile defense cooperation with the United States and is looking for ways to balance against Chinese power more broadly. And neither nuclear competition nor the evolution of nuclear forces and thinking shows any signs of abating in South Asia.

Chinese Nuclear Futures: Three Scenarios

Building on potential drivers and our assessment of their probabilities, the scenarios in this subsection illustrate a range of possible outcomes. We do not present bookends, extreme cases with low likelihood. Instead, we developed three scenarios that represent a range of outcomes, based on possible developments with regard to the most important internal and external drivers discussed in earlier chapters. While some scenarios may be more likely than others, each represents views that may be described as mainstream among analysts of Asian security issues.

The scenarios vary in the degree and type of perceived external threat on the one hand and in the extent of civilian political oversight and intervention in key nuclear decisions on the other. In the first scenario, a relatively stable and pacific external environment combines with strong political leadership to keep China on its current trajectory. In the second, increased external challenges, especially a deterioration in Sino-American relations, combine with a moderately engaged leadership in Beijing to produce accelerated nuclear modernization and some limited shifts in the interpretation of the no-first-use policy. In the third scenario, a challenging external environment, increased competition from a rapidly rising India, continuing issues with the United States, and a divided and relatively hands-off civilian leadership in Beijing produce both an acceleration of nuclear programs and the rapid evolution of doctrinal thinking.

Scenario 1: Current Trajectory

China could remain on its current trajectory. This would require a stable and relatively benign international environment combined with relatively strong political control of not only nuclear policy but also of important procurement and doctrinal questions.

Hypothetical Conditions

While there are many specific forms this scenario could take, it is worth imagining one specific possibility. In this world, the Sino-American relationship is characterized by a high degree of cooperation. The cross-strait relationship is basically stabilized and is characterized largely by growing economic cooperation and cross-strait exchanges. Japan and China have not resolved the Senkaku/Diaoyu issue but have agreed to refrain from potentially dangerous activities in the vicinity. Likewise, China's ties to India have improved. In an effort to maintain growth, Beijing has focused on economic cooperation with both India and Japan, and they have responded in kind. Chinese economic growth continues to edge downward but remains high enough to support domestic requirements and military modernization. Changes in North Korea have diminished concerns about Pyongyang and led the United States to freeze its missile defenses at roughly current levels. The leadership in Beijing takes a relatively hands-on approach to important military decisions, including those in the nuclear realm.

Outcome

Even in this optimistic scenario, China will likely continue to modernize its nuclear force. Chinese leaders see a survivable second-strike capability as an essential pillar of its strategic deterrence posture and remain concerned that, although U.S. missile defenses have not expanded in scale, qualitative improvements might nevertheless jeopardize Chinese retaliatory capabilities. But in this scenario, China adopts a portfolio approach that emphasizes qualitative improvements and countermeasures, rather than a rapid increase in numbers of offensive systems. By 2025, China has continued to upgrade its silo-based ICBMs and has deployed more-survivable road-mobile ICBMs, including the MIRVed DF-41 road-mobile ICBM. Additionally, PLAN SSBNs conduct regular nuclear deterrence patrols, and China begins to deploy a small number of HGVs in a nuclear deterrence role.

Beijing continues to adhere to its no-first-use policy but remains resistant to the idea of participating in bilateral or multilateral nuclear arms control negotiations. At the same time, however, China is becoming more open to dialogue on nuclear issues. Indeed, U.S.-China exchanges on nuclear and strategic deterrence issues have become more regularized, including the establishment of an annual dialogue between U.S. Strategic Command and PLA Rocket Force and PLAN leaders. Beijing's approach also includes increased willingness to discuss confidence-building measures and informal understandings intended to increase strategic stability between the two sides, such as agreeing to deploy conventional and nuclear global strike capabilities at different bases. Although China still resists pressure to participate in formal arms control negotiations, it has suggested it might be willing to reach a less-formal understanding in which it would impose a voluntary ceiling on the number of strategic nuclear weapons it deploys based on a given set of U.S. NMD, nuclear, and CPGS capabilities.

Scenario 2: Accelerated Buildup

Several developments could lead to an acceleration of China's nuclear programs. The most important would be a worsening of Beijing's external security environment paired with a political leadership that maintained a firm hand on nuclear policy but was less involved in the details of nuclear procurement and doctrine.

Hypothetical Conditions

Once again, there are many specific forms that such a scenario could take, and it is useful to specify one concrete example. In this world, Beijing's continuing high-handed actions in the South China Sea and East China Sea have further exacerbated tensions with Vietnam, the Philippines, and Japan, drawing the United States into more frequent and bitter confrontation with China. Beijing still seeks to avoid outright conflict, if possible, but it is deeply concerned that the United States aims to contain China. Some in Beijing argue that a military conflict with the United States is inevitable. Japan hugs its U.S. ally more closely, and the two cooperate on building a more

robust TBM system. The United States also enhances its NMD program, with a tiered defense against ICBMs, following North Korea's testing of ICBMs. One bright spot for Beijing is a flourishing trade and political relationship with India and progress on settling the disputed frontier boundary. Economic growth is robust, only slightly lower than 2016 rates. Xi Jinping is succeeded by another strong leader who insists that the "military challenge" from the United States must be met but believes that any fundamental departure from the no-first-use policy will damage China's international position.

Outcome

In 2030, China is the world's third largest nuclear power, with about 500 nuclear weapons, about one-third the number of warheads deployed by either Russia or the United States. The cornerstone of China's nuclear force is still the PLA Rocket Force, which operates more than 100 ICBMs capable of reaching the United States, but does not gain control of SSBNs. Many of the Rocket Force missiles carry MIRVs. China has also begun deploying a small number of ICBM-class HGVs. Chinese SSBNs routinely conduct deterrent patrols in areas that allow them to hold U.S. strategic targets at risk. The development of Chinese theater nuclear forces has been heavily shaped by advances China has made with its conventional missile force, resulting in more-advanced missiles with improved accuracy.

In addition to further enhancing the diversity, survivability, and flexibility of its nuclear force, China has tweaked its interpretation of its no-first-use policy. Key PLA texts note U.S. advances in strike and missile defense and stipulate explicitly that China reserves the right to use nuclear weapons if its nuclear infrastructure or forces are attacked by conventional means. China does not explicitly adopt a nuclear war-fighting strategy but has many technologies compatible with such a strategy. China has an increasingly robust early warning system, and Chinese strategists increasingly discuss developing and exercising a launch-on-warning capability. This outcome would have significant ramifications for U.S. extended deterrence in Asia.

Scenario 3: Broader Transformation

Broader changes to Chinese policy, doctrine, and force structure are also possible, although this scenario is significantly less likely than either of the preceding ones. This scenario would probably require a worsening of China's external security environment, strong bureaucratic advocacy, and either the absence of strong political oversight or active political support for adjusting nuclear strategy.

Hypothetical Conditions

In this scenario, Chinese elite politics are characterized by increasingly open fissures. Xi Jinping's successor is a weak leader who seeks, with uneven success, to buy military support with larger budgets and more autonomy. China's relations with the United States are strained by maritime and other disputes in Southeast Asia. Washington

undertakes modest efforts to buttress missile defense but is limited by pressure on defense budgets. Much of Beijing's attention is centered on India. India's economic growth rate has remained higher than China's for most of the past decade. Pakistan's relations with India have worsened with a second Mumbai-style terrorist attack. Responding to Indian conventional threats that follow the attack, Pakistan has aggressively expanded its nuclear arsenal. India responds by modernizing and significantly enlarging its nuclear force and by declaring a policy of flexible response.

India and China have increased military deployments along their mutual border, and several crises have occurred as patrols confront one another along the Line of Actual Control. Indian Air Force officers showcase the deployment of nuclear-capable attack aircraft to bases along the border with China and strongly hint that nuclear weapons have also been forward deployed with them. More broadly, India's flexible response, its introduction of new classes of tactical nuclear weapons, and the deployment of an Indian missile defense system (with U.S. technological support) raise fundamental doubts in Beijing about India's continued adherence to a no-first-use policy. By 2030, India has also deployed more than two dozen intermediate and intercontinental range nuclear missiles capable of targeting Beijing and other key coastal Chinese cities.

Outcome

In 2030, China is the world's third-largest nuclear power, after the United States and Russia. PLASAF deploys close to 100 ICBMs capable of reaching the United States and nearly 75 IRBMs capable of targeting India. Some of these are silo-based, but most are road mobile, including a growing number of IRBMs and ICBMs that carry MIRVs. Beijing has also developed an increasingly credible sea-based nuclear deterrent, which now includes new Type-096 SSBNs and JL-3 SLBMs. Additionally, PLAAF has equipped a portion of its H-6 bomber force with nuclear-armed air-launched cruise missiles and has rolled out the prototype of a new stealthy, long-range bomber. China now possesses a triad composed of PLASAF land-based missiles, PLAN SSBNs, and PLAAF bombers and is further enhancing the diversity, survivability, and flexibility of China's nuclear force. The Areva reprocessing facility has moved forward and will begin operation by 2035, raising concerns about whether some of its production might be devoted to expanding the warhead inventory.

China has formally retained its no-first-use nuclear policy, but signs of evolution in actual policy and doctrine are evident. The policy is qualified by explicit exceptions for attacks on Chinese nuclear forces and infrastructure. Discipline has also eroded. There are more retired officers and pundits willing to make public threats that are either not compatible with or ambiguous about the no-first-use policy, and the no-first-use policy is no longer regarded as credible by non-Chinese audiences. There is an energetic discussion of the role of nuclear weapons in Chinese defense circles. Some Chinese strategists describe the potential for nuclear counterattacks against India that are

far more counterforce than countervalue. These strategists describe damage limiting strikes on certain types of Indian nuclear assets and on conventional force concentrations. A combined exercise by nuclear elements of the Rocket Force in western China and SSBNs deployed to the Indian Ocean appears to posit an extended warfighting exercise against an unnamed adversary in South Asia.

These activities and discussions raise questions about the direction of Chinese military thinking, especially in the context of evolving capabilities, raising alarm in many regional states and placing the United States and China on a more confrontational path. They also present the United States with questions about crisis stability and its ability to assure allies without undertaking significant adjustments to declaratory policy and, possibly, nuclear deployments.

CHAPTER ELEVEN

China's Accelerating Nuclear Modernization: Implications

China's future nuclear direction will have implications for arms control, arms races, crisis stability and escalation, deterrence, and the reassurance of U.S. allies. As we suggested in Chapter Ten, China's strategic forces and thinking could take a number of different paths, and the implications will depend on which path it takes. The discussion of implications in this chapter does not attempt to parse these differences, but rather treats current trends and direction and provides more-limited comments on some of the potential wildcard developments discussed in Chapter Ten. Following the discussion of implications, we outline what U.S. and Chinese leaders could do differently to mitigate new risks.

Arms Control and Arms Racing

Developments in China's nuclear inventory will have significant effects on global nuclear arms control efforts. China has shown some increased willingness to discuss arms control issues with the United States but demonstrates little readiness to enter serious negotiations with Washington. Chinese strategists suggest that, given the gap between the nuclear inventories of the two sides, the United States and Russia would first have to agree on and implement another round of deep cuts, above and beyond New START, before China would agree. In light of China's expanding nuclear inventory, however, some in the United States and even more in Russia are reluctant to pursue a follow-on U.S.-Russian agreement without China's participation in multilateral talks. Russia's annexation of Crimea, its proxy war with Ukraine, its withdrawal from the 2000 Plutonium Management and Disposition Agreement, and concerns about potential violations of the Intermediate-Range Nuclear Forces treaty have cast a pall on U.S.-Russia arms control. To the extent that China continues to buttress its own offensive capabilities, considerations related to China will complicate any potential second reset between Moscow and Washington. Indeed, some observers have made the case that Russia's Intermediate-Range Nuclear Forces treaty violations are largely

aimed at China.[1] At the same time, increased tensions between Moscow and Washington will further discourage Beijing from engaging in serious arms control dialogue.

On balance, U.S. strategic decisions are more likely to influence China's programs and policy than China's are to affect those of the United States. However, as China's nuclear forces continue to evolve, the dialogue within the United States, especially on BMD, could shift. U.S. analysts, pundits, and elected leaders may begin to discuss missile defense capabilities in the context of nuclear conflict with China, especially if the broader political relationship also deteriorates. Building missile defenses against China would be far more demanding than establishing them to address North Korean threats and would face enormous challenges associated with technology, feasibility, and scale. Such an effort would likely trigger an action-reaction dynamic between U.S. defenses and Chinese offensive systems, possibly leading to a very rapid increase in Chinese system numbers. Alternatively, China might consider accelerating HGV, decoy, mobility, early warning, and other programs designed to improve survivability or counter defenses with new technologies.

We have already noted that China could adopt a different standard of nuclear sufficiency against a rising India than it has with regard to Russian and U.S. capabilities. At a minimum, India's growing nuclear capabilities will pose new problems that will be discussed and debated in Chinese strategic circles. The perspective from India is clearer. Many Indian nuclear analysts openly cite Pakistan and China as the two primary contingencies against which Indian nuclear forces are designed. Although the gap between Chinese and Indian nuclear capabilities remains large, India is arguably narrowing the relative difference by building at roughly the same rate as China and improving the range and quality of its delivery systems. If, however, renewed Chinese efforts begin to reverse India's relative gains, India might feel pressure to redouble its already substantial effort—and Pakistan could follow suit.

The point is not that China is the potential initiator of action-reaction dynamics or the primary obstacle to arms control. It is, rather, that China is enmeshed in nested security dilemmas that are interconnected. Causality can run various directions, with consequences potentially reaching states that do not interact directly. Dynamics between China and its neighbors or between Beijing and Washington could also affect global nonproliferation efforts. The global nonproliferation regime gains a measure of moral strength from the efforts of existing nuclear powers to reduce the roles and sizes of their own nuclear arsenals. Clearly, the thinking of leaders in such countries as North Korea will be little affected by such trends, but the impact may be greater on support for efforts to contain or roll back the nuclear and missile programs of "rogue" states.

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1 "Why China Should Join the INF Treaty," *East Asia Forum*, April 6, 2016.

Crisis Stability and Escalation

In addition to concerns about arms racing and its potential to affect the nuclear nonproliferation regime, we also need to consider how China's nuclear developments might affect crisis stability and prospects for conflict escalation. *Crisis stability* can be described as the degree to which mutual deterrence between adversaries can hold in a military confrontation that has not yet become lethal. Put another way, it is "a measure of the countries' incentives not to preempt in a crisis, that is, not to attack first in order to beat the attack of the enemy."[2] Concerns about escalation, on the other hand, come into play if stability fails and states find themselves in armed conflict. Escalation is the tendency of combatants to increase the force or breadth of their attacks to gain advantage or avoid defeat. The potential consequences of crisis instability and conflict escalation are especially grave when the potential belligerents have nuclear weapons, as would be the case in confrontations involving China and the United States or India.

The term *structural stability* refers to the degree to which preexisting material or physical conditions are conducive to crisis stability when an interstate military confrontation occurs.[3] These conditions include whether the region's geography would make it easy or difficult for an enemy to attack and the size, composition, technology, and doctrine of each side's force structure.[4] Conditions that cause national leaders to believe opponents are not inclined to attack and that successful attack would be more difficult than successful defense contribute to structural stability. The lack of these conditions signals structural stability.[5]

Given these considerations, we have ample cause for concern about structural stability in Asia. The structure, composition, disposition, and doctrines of Chinese and U.S. conventional military forces are one concern. Chinese doctrine increasingly emphasizes offensive action as a means of gaining and maintaining the initiative in war, and its thinking on space and cyber issues blurs the line between deterrence and combat.[6] U.S. air forces in the theater consist largely of short-range fighters for strike

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2 Charles L. Glaser, *Analyzing Strategic Nuclear Policy,* Princeton, N.J.: Princeton University Press, 1990, p. 45.

3 For detailed discussion of what constitutes *stability*, in terms of both definitions and nuclear and conventional structural elements, see Robert Axelrod, "The Concept of Stability in the Context of Conventional War in Europe," *Journal of Peace Research*, Vol. 27, No. 3, August 1990.

4 Robert J. Powell, "Crisis Stability in the Nuclear Age," *American Political Science Review*, Vol. 83, No. 1, March 1989; Schelling, 1966, pp. 244–245; Laurence S. Seidman, "Crisis Stability," *Journal of Conflict Resolution*, Vol. 34, No. 1, March 1990. This concept closely parallels what van Evera identifies as the dynamics of offense and defense dominance (Stephen van Evera, "Offense, Defense, and the Causes of War," *International Security*, Vol. 22, No. 4, Spring 1998, p. 6).

5 See Stephen van Evera, *Causes of War: Power and the Roots of Conflict*, Ithaca, N.Y.: Cornell University Press, 1999, pp. 35–38.

6 Dean Cheng, "China's Newest Defense White Paper Suggests Fundamental Change in Perspective," Washington, D.C.: Heritage Foundation, Issue Brief 4428, July 6, 2015; Taylor M. Fravel, "China's Changing

and defensive counterair operations in defense of allies. Once mobilized for combat operations, their proximity to potential adversaries would pose a serious threat of a high-intensity air campaign with little tactical warning and could, at the same time, expose U.S. aircraft to preemptive attack by China's ever-growing force of precision-guided, conventional missiles. The doctrines of both sides' military forces are offensively oriented, emphasizing striking enemies deep, hard, and fast. These are classic conditions for instability and, potentially, rapid escalation. Regional crisis stability may be further undermined by nonstructural factors: Potential belligerents continue to deal with the profound memories and deep consequences of World War II, the Chinese revolution, the Korean War, and the Indo-Pakistani wars. National leaders and their publics often suspect malicious intent when dustups occur.

Within this geostrategic context, we can examine how China's nuclear modernization and the factors that drive it could affect crisis stability and escalation dynamics in Asia. First, it is important to point out that several aspects of Beijing's nuclear policies are broadly conducive to crisis stability. As discussed in Chapter Two, Chinese leaders appear to remain committed to their no-first-use policy, insisting they will not use nuclear weapons in a confrontation or conflict except in response to a nuclear attack on China. To be sure, there are circumstances that would place no-first-use under immense strain, especially the attrition of Chinese strategic capabilities during the course of a conflict. But assuming U.S. leaders are equally committed to avoiding the nuclear threshold and are sensitive to the kinds of activities that would put the greatest pressure on China's no-first-use position, we should, in principal, not have to worry about a confrontation or conflict between the United States and China escalating to a nuclear exchange. In a similar vein, although Chinese military leaders have a growing voice on nuclear issues, the CMC remains in control of nuclear policymaking and the party general secretary plays a central role in his capacity as CMC chairman. To the extent that China's political leaders maintain firm control over decisions regarding the use of nuclear weapons, the chances of inadvertent and accidental escalation decrease.[7]

China's programs to expand and modernize its nuclear capabilities can also be seen as stabilizing in certain respects. As previously explained, China appears committed to maintaining a lean-and-effective nuclear counterstrike capability, which has

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Approach to Military Strategy: The Science of Military Strategy from 2001 to 2013," in Joe McReynolds, ed., *China's Evolving Military Strategy*, Washington, D.C.: Brookings Institution, 2016.

[7] Theoretical treatments of escalation dynamics often overlook the risks of inadvertent and accidental escalation, but they are very real. For the seminal work on the dangers of inadvertent escalation at the end of the Cold War, see Barry R. Posen, "Inadvertent Nuclear War? Escalation and NATO's Northern Flank," *International Security*, Vol. 7, No. 2, Autumn 1982, and Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks*, Ithaca, N.Y.: Cornell University Press, 1991. For development of a framework for managing the risks of deliberate, inadvertent, and accidental escalation, see Forrest E. Morgan, Karl P. Mueller, Evan S. Medeiros, Kevin L. Pollpeter, and Roger Cliff, *Dangerous Thresholds: Managing Escalation in the 21st Century*, Santa Monica, Calif.: RAND Corporation, MG-614-AF, 2008.

often been characterized as a "minimum deterrent," once defined largely in existential terms but increasingly by a perceived requirement for assured retaliation. This is consistent with a no-first-use policy in that, were Beijing planning to conduct a damage-limiting nuclear first strike against the United States, Russia, or probably India, it would need an arsenal much larger than it is currently building. However, lean and effective does not mean "small" in any absolute sense. To remain effective in deterring a nuclear attack, China needs to persuade prospective opponents that it has enough weapons and sufficient capability to survive an enemy's first strike, penetrate its defenses, and inflict unacceptable damage in a counterstrike. Consequently, as the United States develops BMD and CPGS capabilities, Chinese leaders are responding by enlarging their arsenal, MIRVing their missiles, developing penetration aids and other new capabilities, and making their systems more survivable.

To the extent that these measures make Chinese leaders feel less vulnerable to a nuclear first strike and therefore less susceptible to use-or-lose pressures during a crisis or war, the factors outlined immediately above reduce the prospect of nuclear escalation during conflict. This could be particularly important in the event of inadvertent losses to Chinese nuclear forces, command and control, or support structure during a conflict. To the degree that Chinese leaders have confidence in the redundancy of PLA second-strike capabilities, they may be more willing to assume a wait-and-see posture toward retaliation in the face of incremental losses. On the other hand, crisis stability could be undermined at lower levels if more-robust nuclear capabilities provided Chinese leaders an exaggerated belief in their ability to deter U.S. intervention in a conflict or deter U.S. escalation during a conflict. Such confidence could increase Beijing's willingness to use force against regional states, a possibility we address in the next subsection.

Policy changes could also undermine stability, especially if paired with corresponding shifts in capabilities. Beijing remains committed to no-first-use, but arguments Chinese military analysts occasionally make for adding caveats—to include certain types of conventional strikes or even an impending conventional defeat—could blur the no-first-use policy. Such arguments, similar to U.S. threats to use nuclear weapons against a Soviet invasion of Western Europe in the early Cold War, may be calculated to deter the United States from attacking China and could make U.S. leaders more cautious in a crisis or more restrained in a conventional conflict. On the other hand, to the extent that Chinese capabilities and actions are consistent with a weaker, conditional no-first-use policy, the original stabilizing value of the no-first-use policy itself could be undermined. If part of the value of a no-first-use policy and its associated force structure lies in diminished incentives for nuclear preemption on the part of opponents—since the opponent assumes little risk from suffering a first strike—adjusting the policy will work against that logic and could, under particular circumstances, restore some incentive for preemption.

More-tangible risks of instability and conflict escalation can be seen in certain characteristics of China's force structure. For instance, one of China's principal sources of strength is its growing arsenal of precision-guided conventional cruise and ballistic missiles. In the event of a war with the United States, Chinese forces would likely launch sudden, intense strikes on air bases and other military facilities in the Asia-Pacific theater in efforts to unhinge U.S. and allied warfighting capabilities. The offensive punch that these missiles carry, juxtaposed against the potent strike capabilities embodied in U.S. airpower, create mutual vulnerabilities that could drive both sides toward conventional preemption in a crisis and intense, escalatory attacks once a war has begun.

China's comingling of its conventional and nuclear missile forces at the base level exacerbates the problem. It is important to note here that "bases" are not single facilities and that Chinese conventional and nuclear missiles are not mixed in the same brigades. Nevertheless, U.S. attacks against Chinese command-and-control centers to suppress the conventional missile threat could inadvertently degrade Chinese nuclear command and control, generating use-or-lose pressures in Beijing and potentially stumbling over one of China's lowered first-use thresholds. At the same time, China's increased reliance on mobile launchers could make the comingling of forces a serious problem. At some point during an escalating confrontation with the United States, China could be expected to flush its mobile launchers to hide sites and dispersed launch positions. Theoretically, such a move should be stabilizing in that it would reduce the chances of a successful U.S. attack. However, once a conflict has begun, China's dispersal of missile systems in "hides" could further complicate the task of distinguishing nuclear from conventional and increase the probability of inadvertent attacks on the latter.

China's efforts to expand its nuclear capabilities by developing a sea-based deterrent in the form of a fledgling SSBN force presents another potential source of instability and escalation. In the event of a future crisis, PLAN would likely flush its SSBNs, putting them on station at sea. Again, such a move should, in principal, make them more survivable and available for a nuclear counterstrike, thereby deterring a U.S. attack. However, given the technological inferiority of China's SSBNs, U.S. SSNs might detect and begin shadowing these boats as they put to sea. U.S. leaders would likely have the option of ordering their destruction with a high probability of success. Were the crisis to escalate, U.S. leaders might feel increasing pressure to remove this sea-based threat despite the escalation risks involved. Alternatively, SSBNs might be destroyed accidentally in the heat and confusion of battle. Given China's increased reliance on SSBNs for nuclear deterrence and the special ability that attacks with SSBNs might have to avoid U.S. missile defenses, the loss of even one or two boats might push China toward the employment of nuclear weapons in a demonstration role. This risk represents a strong argument for U.S. caution in the treatment of adversary submarines, should a conflict occur.

Implications for Extended Deterrence of Nuclear and Regional Political Stability

China's nuclear modernization and the expansion and diversification of its forces pose growing challenges to the credibility of U.S. extended deterrence. If enough Chinese nuclear forces could survive a U.S. retaliatory strike to conduct a powerful retaliatory strike of their own against U.S. targets, Japanese leaders might ask whether Chinese leaders would take a U.S. threat to strike on Japan's behalf seriously: Would Washington really risk losing Seattle and/or Los Angeles to retaliate after an attack on Tokyo?

An extension of this logic may raise questions in Tokyo and other allied capitals about how changes in the nuclear balance will affect conventional deterrence and the credibility of U.S. alliance commitments more generally. The United States has distanced itself from the threat of nuclear use in the context of conventional attack in recent years, most notably in the 2010 NPR. Nevertheless, any prudent Chinese leader would certainly consider the risks of U.S. escalation to the nuclear level. The deterrent value of these doubts may, however, decline significantly in the context of a more secure and robust Chinese second-strike capability. Chinese leaders might thus accept a higher degree of risk in political and "gray zone" crises with a more robust nuclear force than without. This logic lies at the heart of the so-called stability-instability paradox, within which a more stable nuclear structure may lead to increased instability at lower levels.[8]

With Chinese conventional capabilities improving rapidly and with their ability to threaten significant losses against U.S. forces in a more limited conflict increasing, the shift in nuclear calculations might also become more salient.[9] The United States would probably only consider escalating to the nuclear level if it were losing a conventional conflict or had sustained severe losses (and probably not even then), and the probability of such scenarios, while low today, is growing over time. Hence, nuclear escalation in the context of conventional warfare (i.e., intrawar deterrence or escalation control) may assume greater importance for Chinese leaders as the PLA's conventional capabilities improve.

Questions about how Chinese conventional and nuclear modernization affect both nuclear and conventional deterrence have already become more prominent in South Korea and, especially, Japan. In response to regional concerns, the United States began separate dialogues on strategic issues with both Tokyo and Seoul in 2009. Although elite opinion in Japan is divided, some have suggested a more "NATO-like"

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[8] Michael Krepon, *The Stability-Instability Paradox, Misperception, and Escalation Control in South Asia*, Washington, D.C.: Stimson Center, May 2003. For an application to China and East Asia, see Thomas J. Christensen, "The Meaning of the Nuclear Evolution: China's Strategic Modernization and US-China Security Relations, *Journal of Strategic Studies*, Vol. 35, No. 4, August 2012.

[9] For an assessment of the evolving balance of conventional forces, see Heginbotham et al., 2015.

approach to extended deterrence.[10] While it is unclear exactly what that would look like in East Asia, two features of extended deterrence in the NATO context are prominent: first, the independent possession of nuclear weapons by Britain and France (in addition to the United States) and, second, the participation of a subgroup of NATO allies in NATO's nuclear sharing arrangements.

Should allied concerns continue to grow in Asia, it is likely that five possible responses will, to one extent or another, be discussed. First, there may be appeals for the United States to adjust or clarify its declaratory policy, possibly to include implicit but nevertheless clear nuclear deterrence of conventional attack. Second, there may be calls for the United States to maintain an array of deployable tactical nuclear weapons to signal a credible response in the event of limited Chinese use of nuclear weapons. Third, some regional voices will call for the redeployment of U.S. nuclear weapons to East Asia or onboard naval U.S. surface ships or attack submarines, a position that, under current circumstances, large segments of the populations of allied countries would oppose. Fourth, there will be increased momentum to develop long-range conventional strike capabilities designed to provide at least some punishment capability in the event of Chinese conventional attack. And fifth, should regional actors come to fundamentally question the credibility of U.S. extended deterrence, South Korean or Japanese support for nuclear armament is likely to grow more widespread.[11]

Each of these measures would have significant consequences, including some upside potential for deterrence and alliance solidarity and negative consequences for the U.S. relationship with China and for U.S. global disarmament and nonproliferation efforts. In addition, any unilateral moves by South Korea or Japan would likely affect the thinking and military behavior of the other, given the mutual suspicions between America's two Northeast Asian allies. While the United States will need to balance potential positive and negative consequences to changes in its approach to China and the region, its leaders should understand that the status quo with regard to U.S. nuclear policy and forces will also have consequences. Both the conventional and nuclear balances of power are evolving, and allies may begin to pursue independent options more seriously should the United States appear unresponsive to their concerns. The consequences of some of the possibilities mentioned here would be far more momentous than others, and U.S. leaders should look to shape developments proactively.

Recommendations

The foregoing examination raises questions about what U.S. and Chinese leaders might do to reduce the prospects for arms racing and the dangers of crisis instability and con-

[10] Roberts, 2016, p. 206.

[11] For a slightly different list of topics under discussion, see Roberts, 2016, pp. 204–213.

flict escalation, as well as what U.S. strategists might do to mitigate the impact of Chinese nuclear modernization on deterrence and extended deterrence.

First, note that simply telling national leaders that they should abandon certain technologies, programs, or strategies because they are destabilizing will have little or no effect. That is especially true of programs that are well advanced. China will not stop modernizing and expanding its nuclear counterstrike capabilities. Beijing will, rather, continue pursuing the programs in keeping with available resources and perceived threats (as interpreted and filtered through the prism of political and bureaucratic lenses). U.S. leaders will not cancel such programs as BMD and CPGS. These systems support a wide range of mission requirements that are separate from the U.S.-Chinese strategic relationship. U.S. leaders may, however, continue to limit or restrict these programs. North Korean leaders are unlikely to embrace nuclear disarmament, unless squeezed far more severely by sanctions. Similarly, the United States and the Republic of Korea will not accede to North Korean demands to cease combined military exercises because they serve to ensure effective coordination of allied forces.

Yet, despite these structural rigidities, there are several actions that U.S. and Chinese leaders can take to reduce the dangers of crisis instability. The United States maintains a highly potent offensive force posture in Asia but one that is relatively brittle and highly exposed to potential adversary attack. To the extent that the United States can reposture its forces to reduce their exposure to enemy attack and increase operational resilient, it can reduce the potential benefits of a first strike against it and improve crisis stability. The ability to disperse aircraft is already improving with new options in the Philippines, Japan, and Australia. New operational concepts are being explored, and some hardening of military facilities in Guam has also occurred. This is a promising start but should be further developed. Similarly, the U.S. Navy's emphasis on "distributed lethality" helps reduce Chinese incentives to target any given formation (potentially with nuclear weapons). These types of adjustments could be made as part of an active denial strategy, which might be considered as an alternative to more offensive options.[12]

On the Chinese side, the new PLA Rocket Force should work toward visibly separating its conventional and nuclear missile force elements. Although PLA leaders might worry that providing this observable separation would make it more likely that an enemy would conduct conventional attacks on the Chinese homeland, that risk is mitigated by the high levels of survivability that conventional and nuclear mobile missile launchers enjoy. Separating these forces would reduce the more serious risk of rapid escalation toward the nuclear threshold, should a conflict occur.

As Chinese nuclear forces become more robust and survivable, U.S. leaders must take positive steps to fortify the credibility of extended deterrence commitments to

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[12] Eric Heginbotham and Jacob L. Heim, "Deterring Without Dominance: Discouraging Chinese Adventurism Under Austerity," *Washington Quarterly*, Spring 2015.

regional friends and allies, particularly Japan. Combined exercises treating nuclear deterrence and escalation topics should be conducted to supplement nuclear dialogues within the alliance and increase the level of mutual understanding of each ally's thinking and concerns. The modernization of the U.S. tactical nuclear arsenal will likely increase regional confidence in the U.S. commitment to extended deterrence and mitigate, to an extent, concerns about extended deterrence. While U.S. leaders will want to be cautious about any changes to U.S. declaratory policy that might increase the emphasis on nuclear deterrence, they may find some adjustment preferable to independent actions by Japan and/or South Korea.[13] At the same time, the United States should engage Japan proactively on Tokyo's development of conventional long-range strike capabilities to ensure that, if Japan pursues strike capabilities, it develops systems that are secure from attack and, therefore, do not encourage preemption in crisis.

One area where the United States should exercise caution is in the future development of BMD systems. The sizing of U.S. NMD should be strictly limited to the threat North Korea poses. The United States has expanded its inventory of ground-based interceptors to 44, despite the fact that North Korea has yet to deploy a single ICBM capable of reaching the United States. In the minds of Chinese leaders, this commitment of resources to NMD raises questions about the true intent of U.S. missile defense efforts. Missile defense is the largest single external factor driving the expansion of China's ICBM and SSBN force. Washington should continue to emphasize to Chinese leaders the importance to all parties of limiting North Korean missile and nuclear advances and commit to no further expansion of NMD should the DPRK's nuclear and missile programs be frozen—and possibly to reducing the number of interceptors should North Korean programs be dismantled.

At the same time, it is incumbent on Beijing to acknowledge this message. Since a key strategic concern for China is U.S. missile defense capabilities, it is imperative that Beijing recognize that the key regional driver for these is the development of North Korean nuclear programs. Both further nuclear testing and the development of ICBM capabilities by Pyongyang will intensify U.S. missile defense efforts, which in turn will deepen the spiral driving Chinese modernization. Beijing should employ all available leverage, including its ability to restrict oil supplies, to discourage Pyongyang from making further nuclear and missile advances.

China should also specify the calculus it uses to size its forces and should prioritize means other than increasing numbers to buttress survivability. Without such a calculus, there is no logical upper limit to the "lean" force to which China is pledged. Hence, such metrics will not only help U.S. and other states understand China's nuclear logic but will also help Chinese leaders avoid the danger that bureaucratic forces and incrementalism will hijack nuclear force development. As for specific measures to

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[13] See Mark Fitzpatrick, *Asia's Latent Nuclear Powers: Japan, South Korea and Taiwan*, Washington, D.C.: International Institute for Strategic Studies, 2016.

increase survivability, China will almost certainly adopt a portfolio approach, but it should emphasize, for example, higher alert levels (while maintaining tight control over warheads), improved penetration aids, and possibly even point defenses, rather than deploying larger numbers of offensive systems. To the extent that numbers are increased, China should deploy survivable single-warhead delivery systems, rather than MIRVs. To be sure, MIRVing may provide the most efficient use of scarce funds, measured in terms of warheads produced per yuan. But the gains to second-strike survivability would not be proportionate to the number of warheads built because missiles with MIRVs would represent concentrated targets. And the political costs in terms of aggravated regional and U.S. suspicion would be very high.

While the policy measures described here should be encouraged, our research suggests that many of the drivers we have discussed in this report will persist and that the two sides will likely find themselves in a deepening nuclear arms competition. In this context, the importance of avoiding conventional conflict takes on a greater priority.

Abbreviations

BMD	ballistic missile defense
CCTV	China Central Television
CMC	Central Military Commission
CPGS	conventional prompt global strike
DoD	U.S. Department of Defense
DPRK	Democratic People's Republic of Korea
FBX	forward-based X-band
GDP	gross domestic product
HEU	highly enriched uranium
HGV	hypersonic glide vehicle
ICBM	intercontinental ballistic missile
IISS	International Institute for Strategic Studies
IPFM	International Panel on Fissile Materials
IRBM	intermediate-range ballistic missile
ISR	intelligence, surveillance, and reconnaissance
MIRV	multiple independently targetable reentry vehicle
MRBM	medium-range ballistic missile
NASIC	National Air and Space Intelligence Center
NATO	North Atlantic Treaty Organization
NIE	National Intelligence Estimate

NMD	national missile defense
NPR	Nuclear Posture Review
NPT	Non-Proliferation Treaty; more formally, the Treaty on the Non-Proliferation of Nuclear Weapons
ONI	Office of Naval Intelligence
OSD	Office of the Secretary of Defense
PAC	Patriot Advanced Compatibility
PLA	People's Liberation Army
PLAAF	People's Liberation Army Air Force
PLAN	People's Liberation Army Navy
PLASAF	PLA Second Artillery Force
PRC	People's Republic of China
SIPRI	Stockholm International Peace Research Institute
SLBM	submarine-launched ballistic missile
SOP	standard operating procedure
SSBN	ballistic missile submarine
SSN	nuclear-powered attack submarine
START	Strategic Arms Reduction Treaty
TBM	theater ballistic missile
TEL	transporter-erector-launcher
THAAD	Terminal High-Altitude Area Defense
TMD	theater missile defense
UN	United Nations

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China's approach to nuclear deterrence has been broadly consistent since its first nuclear test in 1964. Key elements are its no-first-use policy and reliance on a small force of nuclear weapons capable of executing retaliatory strikes if China is attacked. China has recently accelerated nuclear force building and modernization, and both international and domestic factors are likely to drive faster modernization in the future. Chinese nuclear planners are concerned by strategic developments in the United States, especially the deployment of missile defenses. Within the region, Beijing is also an actor in complex multilateral security dynamics that now include several nuclear states, and the improving nuclear capabilities of China's neighbors, especially India, are a growing concern for Beijing. Constituencies for nuclear weapons have gained in bureaucratic standing within the People's Liberation Army. With few, if any, firewalls between China's conventional and nuclear missile forces, new technologies developed for the former are already being applied to the latter, a trend that will almost certainly continue. Given these changes, China is likely to increase emphasis on nuclear deterrence, accelerate nuclear force modernization, and make adjustments (although not wholesale changes) to policy.

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ISBN-13 978-0-8330-9646-3

RR-1628-AF